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OPHTHALMOLOGICAL TRANSACTIONS

VOL. XX

TRANSACTIONS

OF THE

OPHTHALMOLOGICAL SOCIETY

OF THE

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1900

TRANSACTIONS

OF THE

OPHTHALMOLOGICAL SOCIETY

OF THE

UNITED KINGDOM

VOL. XX

SESSION 1899-1900

WITH

LIST OF OFFICERS, MEMBERS, ETC.

LONDON
J. & A. CHURCHILL
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IN EXCHANGE.

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Annals of Ophthalmology and Otology, Chicago.
Archiv für Ophthalmologie, Von Graefe.
Archives de Neurologie, Charcot.
Archives d'Ophtalmologie, Panas, Landolt, et Gayet.
Archives of Ophthalmology, Knapp and Schweigger.
Bericht der ophthalmologischen Gesellschaft, Heidelberg.
Brain.
Centralblatt für praktische Augenheilkunde, Hirschberg.
Klinische Monatsblätter für Augenheilkunde, Zehender.
Ophthalmic Record, Chicago.
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Royal London Ophthalmic Hospital Reports.
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NOTICE.

The present volume comprises the proceedings of the Ophthalmological Society of the United Kingdom during its Nineteenth Session, October, 1899, to July, 1900.

The Society does not hold itself responsible for the statements, reasonings, or opinions expressed in the communications which the Council has deemed suitable for publication.

11, Chandos Street,
Cavendish Square, W.
October, 1900.

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1895	W. R. GOWERS, M.D., F.R.S.
1896	PROF. SNELLEN (Utrecht).
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Professor Zehender, Munich.
Professor Leber, Heidelberg.
Professor Hansen Grut, Copenhagen.
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O.M.—Original Member.
Pres.—President.
V.-P.—Vice-President.
T.—Treasurer.
L.—Librarian.
S.—Secretary.
C.—Member of Council.
*.—Denotes Resident Life Members.
†.—Denotes Non-Resident Life Members.

GENERAL LIST OF MEMBERS.

ELECTED

O.M. *Abercrombie, John, M.D. (T.), 23, Upper Wimpole Street, W. (S. 1882-5. C. 1885-8. V.-P. 1897-8.)

1884 †Allison, H., M.D., care of Messrs. Binny and Co., Madras, India.

1899 Amenabar, Julio Daniel, Guayacan, Coquimbo, Chili.

1887 *Anderson, Tempest, M.D., 17, Stone-gate, York.

1883 Andrews, A. G., Carlton House, Moss Lane East, Manchester.

ELECTED

O.M. Archer, T. Brittin, 29, Nottingham Place, W.

1891 †Armstrong, Hugh, Hobart, Tasmania.

1895 Attlee, John, M.B., 58, Brook Street, W.

O.M. Bankart, James, M.B., 19, Southernhay, Exeter. (V.-P. 1890-93.)

1900 Barker, H. J. Glanville, P.M.O., Kuching, Sarawak, Borneo.

O.M. *Barlow, Thomas, M.D., 10, Wimpole Street, W. (C. 1880-81. V.-P. 1894-7.)

1889 †Barrett, James W., M.D., 34, Collins Street East, Melbourne, Australia.

1883 Barton, J. Kingston, 2, Courtfield Road, Gloucester Road, S.W.

1892 Batten, Rayner D., M.D., Campden Lodge, Campden Hill Road, W.

1888 *Beaumont, W. M., 4, Gay Street, Bath.

O.M. *Beevor, C. E., M.D., 33, Harley Street, W. (S. 1891-4. C. 1894-7.)

1891 †Bennett, Alfred H., Kapunda, South Australia.

1897 Bennett, H. Percy, 8, St. Mary's Place, Newcastle-on-Tyne.

O.M. Benson, A. H., M.D., 42, Fitzwilliam Square, Dublin. (C. 1888-91.)

O.M. Berry, G. A., M.D., 31, Drumsheugh Gardens, Edinburgh. (C. 1889-92. V.-P. 1895-8.)

1899 Bickerton, R. E., M.B., 137, Harley Street, W.

1881 *Bickerton, T. H., 88, Rodney Street, Liverpool. (C. 1895-8.)

1892 Black, John Wilson, M.D.Edin., 46, Academy Street, Inverness.

1891 Black, J. Urquhart, M.B., 32, Weymouth Street, Portland Place, W.

1898 Blair, Charles Samuel, M.D., 117a, Harley Street, W.

1885 Blumer, W. P., Rydal House, Sunderland.

1890 Bokenham, T. J., 10, Devonshire Street, Portland Place, W.

ELECTED

1895 †Bonar, Thomson, M.D., 114, Via del Babuino, Piazza di Spagna, Rome.

1885 Bower, Ernest Dykes, Elton House, Gloucester.

1897 Bower, John A., M.B., Portland House, Cheltenham.

1893 Bowerman, Albert Claude, M.B., Gwynedd, Bloomfield P.O., Ontario, Canada.

O.M. Brailey, W. A., M.D. (V.P.), 11, Old Burlington Street, W. (S. 1883-6. C. 1880-3, 1886-9.)

1897 Breuer, August, M.D., 10, Finsbury Circus, E.C.

1899 Brewerton, Elmore, 19, Portland Terrace, Regent's Park, N.W.

1891 Bristowe, Hubert Carpenter, M.D., Wrington, Somerset.

1886 Bronner, Adolph, M.D., 33, Manor Row, Bradford. (C.)

O.M. Browne, Edgar A., 39, Rodney Street, Liverpool. (C. 1887-90. V.-P. 1893-6.)

1898 Browne, James M., M.B., 27, Wellington Road, Cork.

1895 Browne, J. W., M.D., 10, College Square North, Belfast.

1893 †Bull, G. J., M.D., 4, Rue de la Paix, Paris.

1889 Bullar, John F., M.B., 7, Carlton Crescent, Southampton.

1883 †Buller, Frank, M.D., 838, Dorchester Street, Montreal Canada.

1897 Bulteel, Marcus Henry, 84, Durnford Street, Stonehouse, Plymouth.

O.M. †Burnham, G. H., M.B., 157, Simcoe Street, Toronto Canada.

O.M. Buzzard, Thomas, M.D., 74, Grosvenor Street, W. (V.-P. 1888-91. C. 1881-2.)

1897 Byers, W. Gordon M., M.D., Moorfields Eye Hospital, E.C.

1892 †Caiger, Herbert, M.B., Jacobsdal, Orange Free State.

1891 Campbell, E. Kenneth, M.B., 23, Wimpole Street, W.

1887 Cant, W. E., M.D., British Ophthalmic Hospital, Jerusalem, Palestine.

ELECTED

1882 *Cant, W. J. (C.), 3, Lindum Road, Lincoln.

1891 Cargill, L. Vernon, 15, Stratford Place, W.

1888 Carter, Rowland W., M.D., 13, Gloucester Row, Weymouth, Dorset.

1895 Cartwright, E. H., M.D., 1, Bower Terrace, Maidstone, Kent.

1898 Chatterton, Edgar, 2, Upper Westbourne Terrace, Hyde Park, W.

1885 Chesshire, Arthur Edwin, 55, Darlington Street, Wolverhampton.

1897 Chetwood-Aiken, K. C., M.B., C.M., 58, Lemon Street, Truro.

1885 Clarke, Ernest, M.D., B.S., 3, Chandos Street, Cavendish Square, W. (C. 1893-6.)

1899 Cole, J. M. Coates, 10, Euston Square, N.W. (Curazao).

1899 Coleman, Maurice W., Beaufort House, Reading.

1885 Collins, E. Treacher (S.), 17, Queen Anne Street, Cavendish Square, W. (C. 1889-92.)

1886 Collins, W. J., M.S., M.D., B.Sc., 1, Albert Terrace, Gloucester Gate, Regent's Park, N.W.

1898 Cooper, Austin E., M.D., 41, Sloane Square, S.W.

1894 †Coote, Patrick, M.D., 73, St. Ann Street, Quebec, Canada.

1898 Coulter, Robert J., M.B., 2, Westbourne Place, Clifton.

1884 Coulter, William, M.D., 2/2, Harrington Street, Calcutta.

O.M. Couper, John, 80, Grosvenor Street, W. (C. 1881-2. V.-P. 1895-8.)

O.M. Coupland, Sidney, M.D., 16, Queen Anne Street, W. (C. 1885-8.)

1895 †Courtenay, J. D., M.D., Ottawa, Canada.

O.M. Cowell, George (V.-P.), 19, Harley Street, Cavendish Square, W. (V.-P. 1889-91. C. 1883-6. T. 1891-8.)

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1899 Cresswell, B. P. Skeffington, M.B., B.S., 24, Windsor Place, Cardiff.

O.M. Critchett, G. Anderson (*Pres.*), 21, Harley Street, W. (C. 1883-6. V.-P. 1894-7.)

1898 Critchley, Harry G., M.D., St. Leonard's House, Banbury, Oxon.

1900 Cropper, John, Mount Ballan, Chepstow (Mon.).

1881 Cross, F. R. (V.-P.), Worcester House, Clifton, Bristol. (C. 1891-4.)

O.M. Davidson, A. Deas, M.D., 9, Picton Place, Swansea. (C. 1895-6.)

1884 Davidson, James McKenzie, M.B., 76, Portland Place, W. (C. 1892-5.)

1889 †Davis, G. C., 3, Hyde Park Terrace, 173, Liverpool Street, Sydney, New South Wales.

1897 Dawnay, Arch. Hugh Payan, 24, Upper Phillimore Place, Kensington, W.

O.M. Dent, Clinton Thomas, 61, Brook Street, W.

1881 Dixon, W. E., Bridge Cot, Oulton Broad, Lowestoft.

1889 Dodd, Henry Work, 136, Harley Street, W.

1882 †Dodge, Stephen, M.D., Halifax, Nova Scotia.

1890 Donaldson, Eben., 49, Great James Street, Londonderry.

1899 Douglas, J. Sholto, M.B., George Town, British Guiana.

1890 Douty, Edward Henry, M.B., B.C., 69, Bridge Street, Cambridge.

1887 Doyne, Robert W., 64, St. Giles', Oxford. (C. 1892-5.)

1881 *Drake-Brockman, E. F., 14, Welbeck Street, Cavendish Square, W. (C. 1895-8.)

1889 †Drake-Brockman, Herbert E., Mirzapur, India.

1895 Du Boulay, H. H., 2, Royal Terrace, Weymouth.

O.M. Duncanson, J. J. Kirk, M.D., 22, Drumsheugh Gardens, Edinburgh.

1886 Dunn, Hugh Percy, 54, Wimpole Street, Cavendish Square, W.

O.M. Eales, Henry (V.-P.), 7, Newhall Street, Birmingham. (C. 1890-3.)

ELECTED

O.M. *Edmunds, Walter, M.D., 2, Devonshire Place, Portland Place, W. (C. 1885-8.)

1883 *Emrys-Jones, A., M.D., 10, St. John Street, Manchester.

1887 Ensor, Henry C., 23, Windsor Place, Cardiff.

1900 Evans, John Jameson, M.B., 110, Edmund Street, Birmingham.

1900 Evans, Thomas, 211, Macquarie Street, Sydney, New South Wales.

1891 Evill, F. Claude, Hadleycote, Hadley Green, Barnet.

1896 Eyre, John W. H., M.D., Embankment Chambers, 19, Villiers Street, W.C.

1888 Fergus, A. Freeland, M.B., 22, Blythswood Square, Glasgow.

O.M. †Ferguson, H. L., Dunedin, New Zealand.

1890 Ferguson, R. Bruce, M.D., B.C., 26, Woodland Road, New Southgate, N.

1889 Ferrier, David, M.D., F.R.S., 34, Cavendish Square, W. (C. 1896-7.)

1894 Fischer, E. C., M.B., Royal London Ophthalmic Hospital, Moorfields, E.C.

1895 Fisher, J. Herbert, M.B., 34, Queen Anne Street, Cavendish Square, W.

O.M. Fitzgerald, C. E., M.D., 27, Upper Merrion Street, Dublin. (V.P. 1882-5. C. 1880-1.)

O.M. Fitz-Gerald, W. A., M.D., Monte Carlo, Monaco.

1889 Flemming, Percy, 31, Wimpole Street, W.

1891 Foggin, George, 24, Eldon Square, Newcastle-on-Tyne.

1892 Folker, Herbert Henry, 11, Havelock Place, Stoke-on-Trent.

1886 Ford, A. Vernon, 14, High Street, Portsmouth.

1891 Forward, Francis E., Holberton Institution, St. John's Antigua, W.I.

1898 Frank, Philip, M.D., 3, Elvaston Place, S.W.

O.M. Frost, W. Adams (L.), 30, Cavendish Square, W.

1883 †Da Gama, Jerminio Accacio, Khoja Moola, Bombay.

1895 Galloway, A. Rudolf, M.B., 250, Union Street, Aberdeen, N.B.

ELECTED

1887 †Gardner, John J., M.D., 12, Phillip's Place, Montreal, Canada.

1889 Gibbs, Alfred N. G., 52, Whiteladies Road, Clifton.

O.M. Glascott, C. E., M.D., 23, St. John Street, Manchester. (C. 1896-9.)

1885 †Godfray, Alfred Charles, St. Heliers House, St. Heliers, Jersey.

1899 Goldsmith, Geo. H., M.B., Bedford.

1897 Gordon, William, M.D., B.C., Barnfield Lodge, Exeter.

O.M. Gowers, Sir W. R., M.D., F.R.S., 50, Queen Anne Street, W. (C. 1880-3. V.-P. 1896-9.)

1897 Granger, F. M., 18, Nicholas Street, Chester.

1895 †Grant, H. Y., M.D., 414, Delaware Avenue, Buffalo, U.S.

1895 †Gray, James, M.D., 119, Robert Street, Toronto, Canada.

1887 Green, Edwin Collier, 27, Friar Gate, Derby.

1900 Green, F. W. Edridge, M.D., Hatchcroft House, Hendon.

1896 Grey-Edwards, Henry, M.D., Bank Place, Bangor, N. Wales.

1895 Griffin, W. Watson, M.B., 68, Brunswick Place, Hove, Brighton.

1885 *Griffith, A. Hill, M.D., 17, St. John Street, Manchester. (C. 1893-6.)

1890 Griffith, John, 16, Harley Street, W.

1894 Grimsdale, Harold, M.B., 114, Harley Street, W.

O.M. Grossmann, K. A., 70, Rodney Street, Liverpool.

1899 Gruber, Rudolph, M.D., 67, Wimpole Street, W.

1889 Gunn, Donald S. (C.), 66, Wimpole Street, W.

O.M. Gunn, R. Marcus, 54, Queen Anne Street, W. (C. 1882-5, 1889-92. S. 1886-9. V.-P. 1896-9.)

1898 Guthrie, Leonard G., M.D., 15, Upper Berkeley Street, W.

1887 Habershon, Samuel Herbert, M.D., 88, Harley Street, W. (S. 1894-7.)

1889 Hailes, C. D. G., M.D., Hawkesdale, 27, Alma Road, Clifton.

ELECTED

1885 †Haines, Humphrey, Auckland, New Zealand.

1900 Hallidee, Andrew, M.B., 8, Warrior Square Terrace, St. Leonards-on-Sea.

1896 Hamilton, Robert J., 42, Rodney Street, Liverpool.

1878 †Hamilton, T. K., M.D., Wakefield Street, Adelaide, South Australia.

1899 Hancock, W. Ilbert, Grove House, Belsize Grove, N.W.

1900 Harman, N. B., M.B., St. John's College, Cambridge.

1886 Hartley, Robert N., M.B., 2, Clarendon Road, Leeds.

1882 *Hartridge, Gustavus, 12, Wimpole Street, W. (C. 1889-92. S. 1892-5. C. 1895-8.)

1899 Hawkes, C. S., c/o Dr. A. M. Hawkes, Glan-y-mor, Penally, Tenby, Wales.

1892 Haydon, Frank, Apothecaries' Hall, Water Lane, Blackfriars, E.C.

1898 Hayes, George C., 22, Park Place, Leeds.

1899 Henderson, Edward E., M.B., 12, Kensington Square, W.

1896 Henry, R. Wallace, M.D., 4, Market Street, Leicester.

1897 †Herbert, Surg.-Capt. Herbert, I.M.S. (care of Messrs. H. S. King and Co., 45, Pall Mall, S.W.).

1887 Hern, John, M.D., Semmercote, Darlington.

1895 Hickman, H. R. Belcher, M.B., 5, Harley Street, W.

O.M. Higgens, Charles, 38, Brook Street, W. (C. 1880-3.)

1888 *Hinnell, J. S., M.B., 62, Garland Street, Bury St. Edmunds.

1899 Hobday, James, M.B., 12, Portland Gardens, Finsbury Park, N.

1886 †Hodge, Rev. Sydney Rupert, Wesleyan Mission, Hankow, China.

1897 Hogg, G. H., M.D., 95, George Street, Launceston, Tasmania.

1889 Holthouse, Edwin H., M.B., 20, Bisham Gardens, Highgate, N.

ELECTED

1898 Hopkinson, Emilius, 9, Holywell, Oxford.

1893 †Howe, Lucien, 183, Delaware Avenue, Buffalo.

1884 †Hudson, Ernest, Central Gaol, Benares, N.W.P., India.

1889 †Hughes, Samuel H., Gingola, Mowbray Road, Willoughby, Sydney, New South Wales.

1893 †Hughes, Wilfrid Kent, M.B., 102, Collins Street, Melbourne.

O.M. Hutchinson, Jonathan, F.R.S., 15, Cavendish Square, W. (*Pres.* 1883-6. V.-P. 1880-1, 1886-9.)

1883 †Jackson, James, M.D., Collins Street East, Melbourne, Australia.

O.M. Jackson, J. Hughlings, M.D., F.R.S., 3, Manchester Square, W. (*Pres.* 1889-90. V.-P. 1880-2, 1890-3.)

1898 James, George Brooksbank, 1, Carlisle Mansions, Victoria Street, S.W.

1888 James, J. T., M.D., 30, Harley Street, W.

1883 †Jenkins, E. J., M.D., Nepean Towers, Douglass Park, Sydney, N.S.W., Australia.

1883 Jessop, W. H. H., 73, Harley Street, W. (C. 1889-92.)

1882 Johnson, G. Lindsay, M.B., Cortina, 24, Netherhall Gardens, South Hampstead.

1888 †Johnston, Geo. D., Georgia Street, Vancouver, British Columbia.

1899 Jones, Arthur H., M.D., 45, Sheep Street, Northampton.

O.M. Jones, Evan, Ty-mawr, Aberdare, Glamorganshire.

1898 *Jones, George, M.B., 8, Church Terrace, Lee, S.E.

O.M. Jones, H. Macnaughton, M.D., 141, Harley Street, W.

1897 Jones, Hugh E., 7, Rodney Street, Liverpool.

1894 †Jones, R. H., M.B., B.S., 209, Macquarie Street, Sydney, New South Wales.

O.M. Juler, H. E. (V.-P.), 23, Cavendish Square, W. (C. 1886-9.)

1899 Keeling, G. S., 23, Cavendish Square, W.

1900† Kelsall, H. T., M.D., 1, Devonshire Terrace, Perth, W. Australia.

ELECTED

1897 Kemp, Charles, M.B., C.M., 6, Winchester Street, South Shields.

1898 †Kendall, H. W. Martindale, Wellington, New Zealand.

1900 Kenna, Patrick James, M.B., Liverpool Street, Hyde Park, Sydney, N.S.W.

1888 †Kenny, Augustus Leo, M.B., 87, Collins Street, Melbourne, Victoria, Australia.

1890 Keogh, Alfred H., Surgeon-Major, M.D., M.Ch., Station Hospital, Barrackpore, Bengal, India.

1891 Kingdon, E. C., M.B., C.M., 4, Upper College Street, Nottingham.

1900 Kirkland, Thomas Spier, M.B., College Street, Sydney, N.S.W.

1895 Knaggs, Robert Lawford, M.D., 27, Park Square, Leeds.

1881 †Knaggs, S. T., M.D., 16, College Street, Hyde Park, Sydney, New South Wales.

O.M. Lang, William (V.-P.), 22, Cavendish Square, W. (C. 1886-9.)

1881 Langdon, J. Winkley, 4, Winkley Square, Preston.

O.M. Lawford, J. B. (C.), 99, Harley Street, Cavendish Square, W. (C. 1886-9. S. 1895-8.)

1889 *Laws, Wm. G., M.B., 3, East Circus Street, Nottingham.

1896 Lawson, Arnold, M.D., 12, Harley Street, W.

O M. Lawson, George, 12, Harley Street, Cavendish Square, W. (C. 1882-4. V.P. 1892-5.)

1895 †Lea, J. Augustus, M.B., Royal Colonial Institute, Northumberland Avenue, W.C.

1885 †Le Cronier, Hardwick, St. Heliers, Jersey.

O.M. Lediard, H. A., M.D. (C.), 35, Lowther Street, Carlisle.

1885 Lee, Charles G., 73, Rodney Street, Liverpool.

1896 Lister, W. T., M.B., Rose Hill, Totteridge, Herts.

C.M. Little, David, M.D., 21, St. John Street, Manchester. (V.-P. 1888-91. C. 1880-1.)

1892 Lodge, Samuel, jun., M.D., 13, Manningham Lane, Bradford.

ELECTED

1883 Lunn, J. R., Resident Medical Officer, Marylebone Infirmary, Notting Hill, W. (C. 1892-5.)

1899 Lyle, Herbert W., M.B.Lond., 178, Amhurst Road, Hackney Downs, N.E.

1900 MacAllan, Arthur Ferguson, M.B., Royal London Ophthalmic Hospital, City Road, E.C.

1892 Macarthur, Robert F., M.B., 32, Weymouth Street, Portland Place, W.

1888* Mackay, George, M.D. (C.), 20, Drumsheugh Gardens, Edinburgh.

O.M. Mackenzie, F. M., 29, Hans Place, S.W.

1889 †Mackenzie, F. Wallace, M.B., 139, Upper Willis Street, Wellington, New Zealand.

O.M. Mackenzie, Stephen, M.D., 18, Cavendish Square, W. (S. 1880-2. C. 1882-5. V.-P. 1893-6.)

1889 MacLehose, Norman M., M.B., 13, Queen Anne Street, Cavendish Square, W.

1897 Maclennan, Duncan N., M.D., Moorfields Eye Hospital, E.C.

1892 †MacLeod, Charles G., M.B., 26, College Street, Hyde Park, Sydney, N.S.W.

1881 †Maconachie, G. A., Brigade Surgeon Lieutenant-Colonel, M.D., 39, Queen's Road, Aberdeen.

1899 Maddox, Ernest E., M.D., Lansdowne Road, Bournemouth.

1883 †Maher, W. Odillo, M.D., 20, College Street, Hyde Park, Sydney, N.S.W.

1899 †Manché, Charles, B.A., M.D., 18, Sda. Molïni, Valletta, Malta.

1883 †Marlow, Frank William, M.D., 401, Montgomery Street, Syracuse, New York State, U.S.A.

1892 Marshall, Charles Devereux, 112, Harley Street, W.

1888 †Martin, Albert, M.D., Wellington, New Zealand.

1884 Maxwell, Patrick William, M.D. (C.), 19, Lower Baggot Street, Dublin.

1893 Maynard, Frederic Pinsent, Major, Indian Medical Service, care of Grindlay and Co. Calcutta.

ELECTED

1899 Maynard, George D., 7, Mount Park Crescent, Ealing, W.

1890 *McGillivray, Angus, M.D., 23, South Tay Street, Dundee, N.B.

O.M. McHardy, M. M., 5, Savile Row, W. (C. 1887-90.)

1895 †McIntosh, J. R., M.D., 44, King Square, St. John, New Brunswick, Canada.

1895 McKenzie, H. V., M.D., Elmbank, Abbey Road, Torquay.

1884 McKeown, David, M.D., 25, St. John Street, Manchester.

1884 McKeown, W. A., M.D., 20, College Square East Belfast.

O.M. Meighan, T. S., M.D., 15, Elmbank Street, Glasgow.

1897 Miller, G. Victor, M.B., 2, Barrington Crescent, Stockton-on-Tees.

1899 Miller, Herbert Percy, M.D., 100, Stoke Newington Road, N.

1881 †Milles, W. Jennings, care of Drs. Henderson and Macleod, Shanghai, China.

1897 †Minnes, Robert Stanley, M.D., 127, Metcalfe Street, Ottawa, Ontario.

1896 Mooney, Herbert C., M.B., 22, Lower Baggot Street, Dublin.

O.M. Morton, A. Stanford, 133, Harley Street, W. (C. 1886-9.)

1898 Mott, F. W., M.D., F.R.S., 25, Nottingham Place, W.

1890 Mowat, Daniel, M.D., St. Ninian's, 93, Stamford Hill, N.

O.M. Mules, P. H., M.D. (V.-P.), Chester. (C. 1886-9.)

1899 Murphy, James Keogh, 35, Prince's Square, W.

1891 Myddelton-Gavey, Edward Herbert, 124, Harley Street, W., and Tunbridge Wells.

1893 Napier, F. H., M.B., B.S., 18, Brandon Place, Glasgow.

O.M. *Nelson, Joseph, M.D., 29, Wellington Place, Belfast. (C. 1893-5.)

ELECTED

O.M. *Nettleship, Edward (V.-P.), 5, Wimpole Street, W. (*Pres.* 1895-7. S. 1880-3. C. 1883-6. V.-P. 1886-9.)

1881 Nicholson, A., 30, Brunswick Square, Brighton.

1895 *Ogilvie, F. Menteith, M.B., 53, Broad Street, Oxford.

1895 Ogilvy, Alexander, M.B.. Montrose House, Clifton.

1889 †O'Kinealy, Frederick, Surg.-Capt. I.M.S., care of Messrs. King, Hamilton, and Co., 7, Hare Street, Calcutta.

1884 Oldham, Charles J., 38, Brunswick Square, Brighton. (C. 1897-1900.)

1899 Oldmeadow, Lloyd J. H., 15, Half Moon Street, W.

1881 Ormerod, J. A., M.D., 25, Upper Wimpole Street, W. (C. 1891-4.)

1899 Ormond, Arthur Wm., 22, St. Thomas Street, London Bridge, S.E.

1892 †Orr, Andrew William, M.D., A. M. P. Buildings, Edward Street, Brisbane.

1890 †Osborne, A. B., M.D., 46, McNab Street South, Hamilton, Canada.

O.M. Owen, D. C. Lloyd, 41, Newhall Street, Birmingham. (V.-P. 1891-4.)

O.M. Page, Herbert W., 146, Harley Street, W. (C. 1890-3.)

1890 †Palmer, L. Loran, M.D., 42, St. George Street, Toronto, Ontario, Canada.

1894 *Parker, Herbert, 7, Bloomsbury Place, W.C.

1899 Parker, Herbert George, 29, Chorley New Road, Bolton.

1900 Parsons, John Herbert, 28, Great Ormond Street, W.C.

1893 Part, J. Shepley, 20, Ashchurch Park Villas, Goldhawk Road, Ravenscourt Park, W.

1887 †Patell, D. H., 12, Ragoonatti Dadagi Street, Fort Bombay.

1900 Patkar, Bhagrant Sakharam, Esplanade Cross Road, Bombay, India.

ELECTED

1897 Pechell, Horace James, M.B., 12, Church Street, Merthyr Tydvil.

O.M. Penfold, Henry, 7, Brunswick Place, Brighton.

1888 Percival, Archibald Stanley, M.B., B.Ch., 16, Ellison Place, Newcastle-on-Tyne.

1891 Perry, A., Surgeon-Major, Principal Civil Medical Officer, Ceylon.

1889 †Perry, Francis F., Lahore Medical College, Punjab, India.

1889 Phillips, T., 124, Harley Street, W.

1895 Pickard, Ransom, M.D., 31, East Southernhay, Exeter.

1900 Pockley, Francis Antill, M.B., 227, Macquarie Street, Sydney, N.S.W.

1896 Pooley, G. H., Royal Westminster Ophthalmic Hospital.

1894 †Pope, R. J., M.D., Box 497, G.P.O., Sydney, N.S.W.

1900 Pope, Thomas Henry, M.D., B.Sc., Marshall's Road, Egmore, Madras, India.

O.M. Power, Henry, 37A, Great Cumberland Place, W. (*Pres.* 1890-3. V.-P. 1882-5, 1893-6. C. 1880-2.)

1899 Price, Henry J., Maldon, Essex.

1888 Price, John A. P., M.D., 124, Castle Street, Reading.

1882 Prichard, Arthur William, 6, Rodney Place, Clifton.

1892 Pronger, Charles Ernest, East Parade, Harrogate.

O.M. Purves, W. Laidlaw, 20, Stratford Place, Oxford Street, W.

1888 Rainy, Adam R., M.B., 6, Upper Wimpole Street, W.

1889 Ramsay, A. Maitland, M.D., 15, Woodside Place, Glasgow.

1899 Read, E. I., Government Medical Officer, Trinidad, West Indies.

1881 †Reeve, R. A., M.D., 22, Shuter Street, Toronto, Canada.

O.M. Reid, Thomas, M.D., 11, Elmbank Street, Glasgow. (V.-P. 1884-7.)

ELECTED

1885 Renton, James Crawford, M.D., 1, Woodside Terrace, Glasgow.

1891 Reynolds, Austin Edward, Chedworth, Orleans Road, Hornsey Rise, N.

1897 Richmond, R., M.D., Brookfield, Woodside, Wimbledon, S.W.

1892 Ridley, Nicholas C., M.B., 27, Horse Fair Street, Leicester.

1897 Rivers, W. H. R., M.D., St. John's College, Cambridge.

1885 *Roberts, Edward, 12, St. John Street, Deansgate, Manchester.

1896 †Roberts, J. R., Surgeon-Captain, M.B., care of Messrs. King, King and Co., Bombay.

O.M. *Robertson, D. Argyll, M.D., 18, Charlotte Square, Edinburgh. (*Pres.* 1893-95. V.-P. 1881-2, 1886-9, 1896-9. C. 1895.)

1891 Robertson-Fullarton, Archibald Louis, M.B., C.M., 201, Bath Street, Glasgow.

O.M. Rockliffe, W. C., M.D. (V.-P.), 17, Charlotte Street, Hull. (C. 1892-5.)

1898 Roe, Arthur Legge, 45, Pryme Street, Hull.

1898 Roll, G. W., M.B., B.C., 6, Gloucester Road, S.W.

1890 Rolston, John R., 14, The Crescent, Plymouth.

1891 Roper, Arthur Charles, The Shrubbery, Exeter.

1882 †Roth, Reuter E., 42, College Street, Hyde Park, Sydney, New South Wales.

1893 Rowan, John, M.B., 9, Blythswood Square, Glasgow, N.B.

1899 *Roxburgh, A. B., M.B., 7, Henrietta Street, W.

1881 †Rudall, J. T., 61, Spring Street, Melbourne, Australia.

1895 Russell, J. S. Risien, M.D. (C.), 4, Queen Anne Street, Cavendish Square, W.

1888 †Sanders, Richard C., M.D., 36, Chowringhee, Calcutta.

1884 *Sandford, Arthur W., M.D., 13, St. Patrick's Place, Cork. (C. 1896-9.)

ELECTED

1881 *Sansom, A. E., M.D., 84, Harley Street, W. (C. 1893-5.)

O.M. Savage, G. H., M.D., 3, Henrietta Street, Cavendish Square, W. (C. 1892-4.)

1891 Schorstein, Gustave, M.D., 11, Portland Place.

1888 Scott, Kenneth, 38, Harley Street, W.

1900 Scottneyliger, E. D., 89, Preston New Road, Blackburn.

1892 Shannon, John Rowlands, M.D., 18, West 35th Street, New York.

O.M. Sharkey, S. J., M.D. (V.-P.), 22, Harley Street, W. (S. 1885-8. C. 1888-91.)

1894 Shaw, Cecil E., M.D., 14, College Square East, Belfast.

1883 Shears, Charles H. (C.), 19, Upper Duke Street, Rodney Street, Liverpool.

1892 Sheppard, Arthur Murray, M.B., 2, Temple Gardens, E.C.

1883 Silcock, A. Q., 52, Harley Street, W. (S. 1889-92. C. 1892-5.)

1893 Simpson, R. J. S., M.B., care of Messrs. Holt and Co., Whitehall Place, S.W.

1899 Sinclair, A. H. H., M.B., 13, Walker Street, Edinburgh.

1891 Sinclair, Walter William, 16, Museum Street, Ipswich.

1898 Smith, G. Bellingham, M.B., 24, St. Thomas's Street, S.E.

1889 Smith, John, M.D., Brycehall, Kirkcaldy, N.B.

O.M. Smith, Priestley (V.-P.), 34, Paradise Street, Birmingham. (V.-P. 1887-90. C. 1883-6.)

1881 Smith, T. Gilbart, M.D., 68, Harley Street, W.

1900 Smith, William E., M.B., Moorfields Eye Hospital, City Road, E.C.

O.M. Snell, Simeon, 70, Hanover Street, Sheffield. (C. 1884-7. V.-P. 1892-5.)

1889 Spencer, Matthew H., M.B., B.Ch., 95, St. Mark's Road, North Kensington, W.

ELECTED

1889 Spicer, Wm. T. Holmes, M.B. (C.), 47, Welbeck Street, W.

1897 Square, James Elliot, 22, Portland Square, Plymouth.

1895 †Stamberg, A. C., M.B., 5, Windsor Terrace, St. Heliers, Jersey, Channel Islands.

1886 Stephenson, Sydney H. A. (C.), M.B., 33, Welbeck Street, W.

1896 Stevenson, Edgar, M.D., 67, Rodney Street, Liverpool.

1893 Stirling, Alexander Williamson, M.D., Atlanta, Georgia.

1887 †Stirling, J. W., M.B., 873, Dorchester Street, Montreal, Canada.

O.M. Story, J. B., 6, Merrion Square North, Dublin. (C. 1885-8. V.-P. 1894-7.)

O.M. †Sturge, W. A., M.D., 15, Rue Longchamp, Nice, Les Alpes Maritimes.

O.M. Swanzy, H. R. (V.-P.), 23, Merrion Square North, Dublin. (V.-P. 1880-1, 1889-92. *Pres.* 1897-9.)

1888 *Sym, William George, M.D., 20, Alva Street, Edinburgh.

1883 †Symons, Mark Johnston, M.D., North Terrace, Adelaide, South Australia.

1886 Sympson, E. Mansel, M.D., Deloraine Court, Lincoln.

1898 Tait, Edward Sabine, M.D., 48, Highbury Park, N.

O.M. Tay, Waren, 4, Finsbury Square, E.C. (C. 1880-2.)

1882 Taylor, C. Bell, M.D., Beechwood Hall, Mopperley Park, Notts.

1899 Taylor, Inglis, M.B., 24, Wimpole Street, W.

1891 Taylor, James, M.D. (C.), 49, Welbeck Street, W. (C. 1894-7. S. 1898-1900.)

1889 Taylor, S. J., M.B., 34, Prince of Wales' Road, Norwich.

1900 Teale, Michael A., 38, Cookridge Street, Leeds.

O.M. Teale, T. Pridgin, F.R.S., 38, Cookridge Street, Leeds. (V.-P. 1880-1.)

ELECTED

1900 Thomas, Frank G., M.B., 2, Brunswick Place, Swansea.

O.M. Thomas, Jabez, Ty-Cerrig, Swansea.

1895 Thompson, Arthur Hugh, M.B., 26, Ellerdale Road, Hampstead.

1885 Thompson, C. Sinclair, The Quay, Bideford, Devon.

1895 Thompson, George W., M.B., 27, Queen Anne Street, W.

1888 Thompson, John Tatham, M.B., 24, Windsor Place, Cardiff.

1895 Thompson, Robert, M.D., B.S., Dalkeith House, Wharf Street, Brisbane.

1898 Thomson, W. Ernest, M.D., 17, Berkeley Terrace, Glasgow.

1883 †Tobin, William, 31, Hollis Street, Halifax, Nova Scotia, Canada.

1900 Tomlinson, John H. Belmont, Vicarage Road, Egham.

1895 Toombs, Herbert George, 7, St. Mary's Road, Bayswater, W.

1883 Tooth, Howard H., M.D., 34, Harley Street, W. (C. 1897-1900.)

O.M. Tosswill, L. H., 28, West Southernhay, Exeter. (C. 1896-9.)

1890 Turner, William Aldren, M.D.(S.), 13, Queen Anne Street, W. (C. 1897-1900.)

O.M. Tweedy, John, 100, Harley Street, W. (C. 1884-7. V.-P. 1891-4.)

1898 Tyrrell, F. Astley Cooper, M.B., St. Thomas's Hospital, S.E.

1883 Uhthoff, J. C., M.D., Wavertree House, Brunswick Place, Brighton.

1894 Usher, C. H., M.B., 3, Bon Accord Square, Aberdeen.

O.M. Vernon, Bowater J., 14, Clarges Street, Mayfair, W.

1888 Walker, Cyril H., M.B., 16, Pembroke Road, Clifton, Bristol.

O.M. Walker, G. E., 45, Rodney Street, Liverpool.

1892 Walker, H. Secker, 44a, Park Square, Leeds.

ELECTED

1893 Warner, F. Ashton, 10, Brechin Place, S.W.

1893 Warren, H. Guy S., 205, Macquarie Street, Sydney.

O.M. Watson, W. Spencer, 1, Duke Street, Manchester Square, W. (C. 1883-6.)

1893 †Weekes, Charles Jones, 36, College Street, Hyde Park, Sydney.

1887 Wells, Arthur P. L., M.B., 83, Harley Street, W. (C. 1896-9.)

1885 Werner, Louis, M.B., 31, Merrion Square North, Dublin.

O.M. West, Samuel, M.D., 15, Wimpole Street, W. (C. 1888-91.)

O.M. *Wherry, G. E., M.B. (C.), Corpus Buildings, Cambridge.

1892 White, G. B. Mower, M.B., 112, Harley Street, W.

1895 Whitehead, Arthur Longley, M.B., 4, Park Square, Leeds.

O.M. Williams, R., 82, Rodney Street, Liverpool. (V.-P. 1896-9.)

1894 Williams, W. E., M.B., Portmadoc, Carnarvonshire.

1888 †Willis, C. Fancourt, M.D., Quetta, Baluchistan, India.

1900 Wood, C. G. Russ, 30, Hoghton Street, Southport.

1889 Wood, David J., M.B., 41, Grave Street, Cape Town, South Africa.

1889 Woodburn, William Harrison, Kent Place, Ulverston.

O.M. Woodhead, G. Sims, M.D., 6, Scrope Terrace, Cambridge. (C. 1894-5.)

1899 Worth, Claud, 138, Harley Street, W.

1890 *Wray, Chas., Bank Chambers, North End, Croydon.

1898 †Wright, Edward Wm., M.D., 115, Montague Street, Brooklyn, New York.

1896 Yarr, M. T., Major, R.A.M.C., c/o the Siamese Legation, 23, Ashburn Place, S.W.

RULES.

1. Object of the Society.—The object of the Society is the cultivation and promotion of Ophthalmology in the United Kingdom, India, and the Colonies.

2. Constitution.—The Society shall consist of Ordinary and Honorary members. All registered medical practitioners of the United Kingdom, and all legally qualified medical practitioners in India and the colonies, whose qualifications are satisfactory to the Council of the Society, shall be eligible as ordinary members.

3. The officers of this Society shall consist of a President, four or more Vice-Presidents, a Treasurer, two Secretaries, a Librarian, and twelve other members, who together shall form the Council and manage the Society's affairs.

4. Ordinary Members.—Candidates shall be proposed on a form provided for the purpose and signed by three members from personal knowledge. The proposal paper shall be read at one Ordinary Meeting, and the Ballot shall be taken at the following meeting. No election shall take place unless ten members vote, and no person shall be elected who does not obtain four fifths of the votes given.

5. Form of Admission by the Chairman.—Members shall be admitted personally by the following form, after signing their names in the Admission Book, and paying their first annual Subscription. *Form of admission.*—"By the authority and in the name of the Ophthalmological Society of the United Kingdom I admit you a member thereof."

6. Honorary Members.—The Council shall have the power of proposing for election as Honorary members men of dis-

tinguished eminence in Ophthalmology, or in the sciences bearing upon it. They shall be elected by ballot in the same manner as Ordinary members at the next meeting. The Honorary members shall not exceed ten in number.

7. Resignation of Members.—Any member may retire from the Society after giving notice in writing to the Secretaries and paying any contribution due.

8. Re-admission of Members.—Any member who has retired from the Society and wishes to rejoin it, must be proposed, balloted for, and admitted in accordance with Rules 4 and 5.

9. Expulsion of Members.—A member can be expelled only at a General Meeting especially called for that purpose, and of which a written notice shall have been sent to every member at least fourteen days previously. At least ten votes must be recorded, and four fifths shall carry the expulsion.

10. Subscriptions.—The Annual Subscription shall be One Guinea, payable in advance in the month of October. Each member on election shall pay an Entrance Fee of One Guinea in addition to the Subscription, but in the case of a member elected at a meeting of the Session subsequent to Easter such member shall not be required to pay a Subscription during the next Session.

11. Arrears.—Any member whose Subscription is six months in arrear shall be reminded of the same by one of the Secretaries, and shall cease to be a member if it be not paid within the current year.

12. Composition Fee for Resident Members. — Any member may on entrance pay a Composition Fee of Fifteen Guineas, and be thereby exempted from paying any further Subscriptions, such member enjoying all the rights and privileges of a Subscribing member. After entrance, the Composition Fee will be according to the following scale:— After less than five payments Fourteen Guineas, after five payments Thirteen Guineas, after ten payments Twelve Guineas, after fifteen payments Eleven Guineas, after twenty payments Ten Guineas, after twenty-five payments Eight and a Half Guineas, after thirty payments Seven Guineas, after thirty-five payments Five Guineas, after forty payments Two and a Half Guineas, and after forty-five payments *nil*.

13. Composition Fees for Non-Resident Members.—Any member resident out of the United Kingdom may pay a Composition Fee of Seven Guineas instead of the Annual Subscription, and will then be entitled to receive, post free, a copy of the Society's 'Transactions' each year; but if at any time such member subsequently become a Resident member of the Society, payment of the Annual Subscription shall be resumed at the end of six years from the date of election, or if more than six years have elapsed, from the date of return to residence. The question of further composition shall be decided by the Council. N.B.—The Composition Fee will be held to include the Entrance Fee if paid any time during the First Session.

14. Election of Officers.—The Officers of the Society shall be elected yearly by Ballot at the Annual Meeting. A Balloting list of the names recommended by the Council for election shall be sent to each Resident member, together with the notice of the Annual Meeting. In the event of any name being substituted for any recommendation of the Council, the election shall not be valid unless effected by a majority of those present at the meeting. The President shall not hold office for a period of more than two consecutive years. No other member of the Council, except the Treasurer and the Librarian for the time being, shall hold the same office for more than three consecutive years. Any ordinary member of Council who has been absent from all the meetings of the Council for one session shall not be eligible for election to the Council for the ensuing session.

15. Scrutineers.—Two Scrutineers appointed by the President at the commencement of the Annual Meeting shall receive the lists during the first hour, and report the result to the President, who shall have a casting vote.

16. President and Vice-Presidents.—The President shall regulate all the proceedings of the Society and Council, state and put questions, interpret the application of the laws, and decide any doubtful points. He shall check irregularities and enforce the observance of the laws. He shall sign the minutes of General and Council Meetings. In the absence of the President one of the Vice-Presidents, the Treasurer, or some other member chosen by the meeting, shall perform his duties.

17. Secretaries.—The Secretaries shall manage all correspondence, shall attend every meeting of the Society and Council, and take minutes, which shall be read at the following meeting. They shall notify to new members their election. They shall arrange with the President the order of proceedings at all the meetings. They shall have charge of and keep a register of all papers communicated, and shall be the Editors of the 'Transactions.'

18. Treasurer.—The Treasurer shall receive all moneys due to the Society, and make all payments ordered by the Council, keeping an account of all such receipts and payments. He shall keep a printed receipt book for the subscriptions, and every receipt shall be signed by himself and countersigned by one of the Secretaries. He shall present to the Annual Meeting a written Report of the financial state of the Society, signed by himself and by two members of the Audit Committee.

19. Librarian.—The Librarian shall have entire charge and control of the Library. He shall purchase books for the Library as opportunities arise at his discretion out of the grant previously voted for this purpose by the Council. He shall see that all books belonging to the Society are duly entered in the Catalogue and that the periodicals and pamphlets are from time to time, as occasion may require, suitably bound. It will be his duty to see that the Library Rules are not infringed.

20. Audit Committee.—The President, one of the Secretaries and two members of the Society nominated by the President at some meeting of the Society previous to the Annual Meeting, shall form a Committee to audit the Treasurer's accounts.

21. Meetings of Council.—The Council shall meet immediately after the meetings in October, January, May, and June, and at such other times as they may be specially convened. Three shall form a quorum. The Council shall determine questions by show of hands (or by Ballot if demanded), the President having in both cases a casting vote in addition to his ordinary vote. The Council shall decide upon all questions relating to the reception of communications, and to their publication in the Society's 'Transactions.'

22. Vacancies of Officers.—The Council shall have the power of filling up any vacancies which may occur in any of

the offices of the Society between one Annual Meeting and another.

23. 'Transactions.'—A copy of the 'Transactions' shall be sent to each Ordinary member of the Society whose subscription is not in arrear, and a copy of the 'Transactions' shall be sent to each Honorary member of the Society.

24. Meetings.—These shall consist of Ordinary, Clinical, Special, and General Meetings.

Ordinary Meetings.—The business during the first half-hour shall consist of the discussion of cases and card specimens, after which papers shall be read and discussed. Nothing relating to the laws or management of the Society shall be considered.

Clinical Meetings.—One or more of the meetings in each session may be devoted exclusively to the exhibition and discussion of cases and specimens. The number and dates of such meetings shall be arranged by the President and Secretaries.

The bye-laws and regulations relating to Ordinary and Clinical Meetings will be found on page xxxviii.

Special Meetings.—At the discretion of the Council an extra meeting may be arranged in order to hold a discussion upon some subject, of which due notice shall be given, or one of the Ordinary Meetings of the Society may be devoted to this purpose.

General Meetings.—The Annual General Meeting, of which every resident member shall receive one week's notice, shall be convened by special summons; ten shall form a quorum. It shall be held immediately after the Ordinary Meeting in July. The business shall consist in the election of Officers, the presentation and adoption of the Annual Report, and the discussion of any proposed alteration of the Rules, notice of which shall be given in the summons convening the meeting. No alteration in the Rules shall be adopted unless four fifths of the votes are given in its favour.

A Special General Meeting may be called at any time, on one week's notice, by the President or any three members of the Council, or on the requisition of fifteen members of the Society. The nature of the business to be transacted at such meetings

shall be specified in the summons sent to each member of the Society, and no other business shall be considered.

Dates and Hours of Meetings.—The dates of meetings shall be, unless otherwise determined by the Council, the third Thursday in October, the second Thursday in November and December, the last Thursday in January, the second Thursday in March, the first Thursday in May, the second Thursday in June, and the Friday after the first Thursday in July. All but the General and Special Meetings shall commence at 8.30, and shall not be prolonged after 10 p.m., except on the proposal of a member, duly seconded, and carried by a show of hands. The hour of all other meetings shall be determined by the President and Secretaries.

25. Visitors.—Each member may introduce as visitors two members of the medical profession to all but the General Meetings. They shall sign their names in the attendance book, opposite to the name of the member introducing them.

26. Order of Communications.—Communications shall be taken in the order in which they have been sent in to the Secretaries, subject to the discretion of the President. If an author be not present when the time arrives for his communication to be read, it shall be dealt with as the President may direct.

27. Publication of Papers and Discussion.—All papers must be sent to the Secretaries at least one week before the meeting, together with an abstract suitable for immediate publication in the journals. When possible, notice should be given relating to card cases, &c. All papers read before the Society shall be deemed the exclusive property of the Society, and if published elsewhere by the author without the express permission of the Council shall thereby be disqualified for admission into the Society's 'Transactions.' No report of the meetings of the Society may be published by members or others without the sanction of the Council.

28. Committee of Reference.—Six members of the Society shall be chosen annually by the Council to act with the Secretaries as a Committee of Reference, and any communication to the Society may be referred by the Secretaries to two or more members of such Committee of Reference for the

purpose of considering the fitness of the communication in question to be read before the Society, or to be published in the Society's 'Transactions.'

LIBRARY RULES.

1. The Library shall be open at the same hours as that of the Medical Society, viz. from 1 p.m. to 6 p.m. daily, except on Saturdays, when it will be closed at 3 p.m.

2. Members will be entitled to read the books belonging to the Society at 11, Chandos Street, between those hours, or to take them out on signing a book provided for that purpose. But any books of extraordinary value may be placed by the Council on a separate list, such books not being allowed to be removed from the Library.

3. A large number of the current periodicals will be accessible to members in the Library. These will not be allowed to be taken out of the Library.

4. A book must be returned at the expiration of a fortnight if wanted by any other member. The Librarian will in such a case write to the member in whose name the book was taken out.

5. If the book be not returned within four days of such notice a fine of 6d. will be charged for each day that the book is retained beyond such days of grace.

6. Instruments and drawings cannot be taken out of the Library except with the express permission of the Council.

7. A member taking out a book will be held responsible for its being returned in good condition.

THE BOWMAN LECTURE.

Resolution of Council, September 18th, 1883.

"That in recognition of Mr. Bowman's distinguished scientific position in ophthalmology and other branches of Medicine, and

in commemoration of his valuable services to the Ophthalmological Society, of which he was the first President, the Council shall each year, or periodically, nominate some person to deliver a lecture before the Society, to be called 'The Bowman Lecture,' which shall consist of a critical *résumé* of recent advances in ophthalmology or in such subject or subjects as the Council shall select, or of any original investigation, and shall be delivered at a special meeting of the Society held for the purpose, at which no other business shall be transacted."

BYE-LAWS CONCERNING COMMUNICATIONS.

1. The 'Transactions' shall consist of such communications made to the Society by or through members, as may be deemed by the Council suitable for publication. Also of discussions of importance or interest arising out of such communications.

2. No communication to the Society shall occupy more than twenty minutes, and in the subsequent discussion of it no member shall speak more than once, or for more than ten minutes, without the special permission of the Chairman.

3. All communications accepted by the Society become the property of the Society.

4. Communications are admissible which may have been read elsewhere, provided they have not been published, and are not intended to be published, in whole or in abstract, through another channel.

5. The cost of illustrations shall be borne by the Society so far as, in the opinion of the Council, is consistent with the state of its funds.

6. Reprints of papers may be obtained by authors at their own expense, by arrangement with the printer.

REGULATIONS CONCERNING THE EXHIBITION OF PATIENTS AND OF PATHOLOGICAL SPECIMENS BY CARD.

A. Patients must attend not later than 8 p.m., and will be allowed to leave at 9.30. A card, provided by the Society, must be placed conveniently near the patient (unless it is undesirable that it should be read by the patient or friends), and on it must be clearly written an account of the case, *comprising all the particulars intended for publication.* The title only of the case will be announced by the President to the meeting, but the Exhibitor (or his representative) must be present at the meeting, and be willing to read the case and furnish additional details if called upon to do so; the length of such oral communications not to exceed five minutes.

The narration and discussion of Card Specimens shall not occupy more than the first half-hour of the meeting.

B. Pathological Specimens may, at the discretion of the Exhibitor, be shown by card, and will then be subject to the above regulations. It is particularly to be noted that the description on the card must *comprise all the particulars intended for publication.*

REGULATIONS FOR CLINICAL EVENINGS.

1. Notice of cases or specimens should be sent in to the Surgical Secretary as early as possible, but not later than the Thursday preceding the meeting.

2. Cases and specimens may be shown without previous notice if there is time, but not until all on the printed list have been disposed of.

3. The number of cases to be shown by any member, and the total number on one evening, to be left to the discretion of the President and Secretaries.

4. A list of the cases and specimens to be sent before the meeting to every member in the kingdom.

5. Particulars of each case to be fully written out before the meeting, and given to the Secretaries at the close of the meeting.

6. A short abstract of the case to be written on the card provided for the purpose, and placed by the patient.

7. The narration of a case shall not occupy more than five minutes, and in the subsequent discussion no member shall speak more than once or for more than five minutes.

8. Patients and specimens to be in place and ready by 8 p.m., one of the Secretaries being in attendance.

9. Unless it be thought undesirable, each patient shall be brought into the meeting room during the narration of the case.

10. If the exhibitor or a representative be not present the case cannot be taken.

11. A case which has been shown at one of the Ordinary Meetings may be subsequently brought forward at a Clinical Evening.

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THE EXTRACTION OF SENILE CATARACT

A RETROSPECT.

BEING

AN INAUGURAL ADDRESS

Delivered before the Ophthalmological Society of the United Kingdom, on October 19th, 1899,

By G. Anderson Critchett, M.A.Cantab., F.R.C.S.Edin.,

PRESIDENT.

Gentlemen,—The dominant feeling which animates me to-night must of necessity be one of gratitude, for your suffrages have made me President of this important and influential Society, and have thus placed the coping stone on my professional career. To fitly acknowledge the kindness and confidence of my colleagues, I feel that "I am even poor in thanks, but I thank you."

Yet, as the waters of the Rhine and Moselle flow side by side, so is there a second current in my thoughts, which takes the dread name of responsibility, and makes me pause at the entrance of the new path which lies before me.

When the distinguished ophthalmic surgeon who immediately preceded me took office, he passed in review the

names of previous Presidents, and spoke of the hea
burden which must rest on him who had to follow m
of such eminence and experience. What then must
my feelings? for now his own name is added to the li
and when I recall the courteous dignity, the cultur
eloquence, and the spontaneous wit which graced l
tenure of this responsible position, I feel that his su
cessor has deep and legitimate claims on your indulgen

I derive some consolation, however, from the reflecti
that every picture needs a background to throw its m
effective qualities into due prominence, and it is possil
that in this humble capacity my own poor efforts m
render some service to those who have gone before.

"On their own merits modest men are dumb," b
I venture to claim that no one has taken a more vigila
interest in the welfare of this Society than I have do
since its first inception under our revered master, S
William Bowman. I have watched its gradual grow
and the spread of its beneficent influence with unalloy
pleasure, and you may rest assured that my best effo
will be directed to foster and promote its welfa
It must always remain a life-long regret to me that m
honoured father did not survive to occupy this chair; b
though his name cannot be enrolled amongst the Pre
dents of our Society, it must ever hold high rank amid
the great pioneers of ophthalmology, and his memory
in safe keeping with all who knew him.

And now, were I to follow the dictates of pruden
and inclination I should bring these few disjoint
remarks to a conclusion; but "Custom exacts—and wh
denies her sway?"—that the opening address from th
chair should deal with some subject in ophthalmolo
which shall be of interest to all, and yet must avoid a
element of polemics. Dr. Swanzy expressed a stro
desire to forego this custom, but his courage failed hi
and in the end he yielded to fate, as I do. I cann
hope to equal the excellence of his address, but I can
least surpass it in brevity, and I may thus earn th

ratitude alike of my present audience and of my ccessor.

I propose to deal with the evolution of cataract opera- ons since Daviel first attempted an extraction in 1745. rior to that time the only recognised method of dealing ith an opaque lens was by couching or discission, and e courage of the French operator must have been akin that of the first sailor, whose feelings were so admirably njectured by the Latin poet.

Daviel's operation was one of simple extraction, and lthough it gained numerous adherents there were many ho continued to rely on the more primitive methods, for a work published as recently as 1838 I find this assage: "Though the advantages of extraction have een vividly portrayed by its friends, there are reasons hich will ever prevent it from being practised by the reat body of the profession. It is both complicated nd difficult, requiring more than an ordinary degree of esolution and steadiness on the part of the patient, and reater experience and manual dexterity than can be xpected from the generality of surgeons." I learn from he same source that Mr. Guthrie first punctured the ornea with a spear-pointed knife, and then introduced is double-bladed knife, the blunt blade being intended keep the iris in its normal situation, whilst the cutting lade was made to slide along the former one, and was hen passed through the opposite side of the cornea, all anger of wounding the iris being then prevented.

The statistics given are somewhat remarkable when iewed by the light of latter-day knowledge, for of 306 ases of extraction at La Charité, in Paris, the cures were the proportion of two and a half to one, while of an qual number of cataracts depressed by Dupuytren at the Hôtel Dieu the successes were more than five to one. After such results as these one can scarcely wonder at Mr. Guthrie's decided expression of opinion that the peration of extraction ought to be performed on both yes at the same time in all favourable cases, because if

an accident should occur, and a very vigorous or prolonged after-treatment be necessary, the patient, whatever the result, would not readily submit to a second operation. There may be a few present to-night who, like myself, have witnessed an old-fashioned flap extraction, but to the majority it must be merely an uncertain item in ancient ophthalmic history, so I will venture briefly to describe the operation. Using either a broad Beer's knife, or the more narrow blade suggested by Sichel, the operator, unaided by either forceps or speculum, strove to accomplish a large flap involving almost half of the cornea, and he considered it in the light of a disgrace if he severed any portion of iris, or emerged through the cornea prematurely. The puncture and counter-puncture were both in the cornea, and the section was made by a steady onward and upward movement of the knife. When all went well at the operation and during the process of healing the result was both optically and cosmetically perfect, but in a large proportion of cases there was an extensive iritic prolapse, for this might be easily induced by a very slight movement on the part of the patient, and in those pre-aseptic days many eyes were lost by suppuration. For more than a century however, the flap operation was the only recognised means of extracting cataract, and the chief point of difference amongst operators was whether the incision should be made upwards or downwards. The English school favoured the former plan, whilst the latter was more frequently practised on the Continent, amongst others by the late Professor Arlt, of Vienna, who in his prime showed exceptional dexterity in this operation.

Passing allusion must be made to the somewhat eccentric method of operating adopted by the late Mr Streatfield, who merely entered the anterior chamber with the point of a Beer's knife, and then, with a series of rapid movements, made his section by means of numerous small cuts. The result in his hands was usually satisfactory, but the plan put a wholly unnecessary handicap upon the

operating surgeon, and it died with its originator. The dawn of a new era was foreshadowed at Moorfields when it was found that results achieved by an operator less skilful than his fellows were exceptionally satisfactory. This gentleman, usually "*malgré lui*," severed the portion of iris which unsteadiness and premature escape of aqueous humour brought in front of his knife, and completed his operative *fiasco* by making a species of curvilinear instead of a true flap section.

The first definite change, however, was made by Prof. Schuft, whose effort at reform was somewhat radical. In lieu of the usual extensive corneal incision he made a narrow slit at the corneo-scleral junction, and the instrument employed was the triangular knife which many operators still use for iridectomy. A considerable portion of iris was removed, and the anterior capsule was lacerated; but in order to ensure the exit of the cataract through the slit-like opening it was necessary to use a spoon. The instrument suggested by the originator of this plan was needlessly large and clumsy, and more than one eminent ophthalmic surgeon placed the hall mark of his inventive capacity upon the form of spoon which he found best suited to the operation. After an extended trial the new proceeding was found, especially on the Continent, to possess many drawbacks. The insertion of a spoon beneath the lens, unless accomplished with exceptional dexterity, often caused rupture of the hyaloid membrane and loss of vitreous, while there was great difficulty in removing fragments of lens substance when cataracts were immature. Many ophthalmic surgeons were returning in despair to the flap operation, when a paper read by my late father, in 1864, at the Congress at Heidelberg, on the excellent results achieved at Moorfields by Mr. Bowman and himself with linear extraction, attracted the attention of that brilliant genius, von Graefe, who at once saw that the object to be gained was the power of making a curvilinear section of sufficient size to allow the ready exit of a cataract without the introduction of any traction instru-

ment into the eye; and he cut the Gordian knot of difficulty with the narrow needle-knife which is in use at the present time, and must always be associated with his name. This instrument practically satisfied all requirements by enabling the operator to make his incision in the situation and of the size which he deemed best. In the operation originally suggested and carried out by von Graefe the incision was limited entirely to the sclerotic, and iridectomy was always performed. A comparatively brief trial of the new operation sufficed to prove that with hitherto unknown advantages came fresh and peculiar dangers. Without the exercise of great care the operator was liable to encroach on the ciliary region, the result being a damaging and sometimes destructive cyclitis, while loss of vitreous was a not infrequent incident in the operation. It became, therefore, a matter for small surprise when various modifications were gradually grafted upon the parent stem; and I may briefly allude to a few of these, some of which have stood the test of time, whilst others have been weighed in the balance and found wanting. A plan which in theory offered great attractions was that devised by the late Prof. Pagenstecher for removing the opaque lens in its capsule, and I had the advantage of seeing it performed by its originator. An exceptionally large incision was made downwards with a Graefe's knife, and after a liberal portion of iris had been removed a capacious spoon was carefully inserted beneath the lens, and the latter was withdrawn in its capsule. Although cocaine was then unknown the operation was usually performed without an anæsthetic, and if all went well the result was excellent, and the avoidance of any subsequent needle operation was an undoubted gain. In too many instances, however, the passage of the cumbrous spoon resulted in a serious loss of vitreous, and this penalty was also attached to the modifications which were subsequently introduced by Mr. Macnamara and Dr. Andrew of Shrewsbury. The last named before using the spoon

inserted a small wire hook to free the lens from its attachments.

The next operation, which had its birth in the early seventies, was that of Dr. Lebrun of Brussels. His plan was to make the incision entirely in the cornea, the insertion of the needle knife being opposite to the centre of the pupil, the line of section lying nearly midway between that point and the corneo-scleral margin; no iridectomy was performed. An almost identical incision has long been in use at Leeds, and was described by Mr. Pridgin Teale in the Bowman Lecture of 1893, but the knife used much resembled that which was introduced many years ago by Wenzel. The lens found ready exit in Lebrun's operation, but the issue too often resulted in extensive anterior synechiæ and a high degree of astigmatism, so that practical experience soon led operators to begin their incision higher up, and to terminate it either at the margin of the cornea or with a small conjunctival flap, and the proceeding as thus modified has numerous adherents at the present time.

Another very ingenious but too complicated operation was suggested by Dr. Bell Taylor of Nottingham. Wishing to avoid prolapse and synechia, and at the same time to preserve the integrity of the pupil, he removed only a sufficient portion of the peripheral margin of the iris to permit the passage of the cataract. When success crowned the efforts of the operator the result was admirable, the iritic aperture being entirely covered by the upper lid, and the pupil being left intact; but so much time was occupied in procuring the egress of the lens through this narrow and delicate opening, and such exceptional technical skill was necessary in the performance of the operation, that it never came into general use, and it has, I believe, been finally abandoned by its expert inventor. This would be an incomplete record if I omitted to mention Professor Förster's method of artificially ripening immature cataract; and in connection with this matter I must make brief allusion to the use of warm

water injections into the anterior chamber for the removal of soft lens substance, as suggested by Dr. McKeown and practised with certain modifications by Dr. Panas and others. The plan has not met with general adoption but is certainly effective in suitable cases. Ophthalmic Surgery has for some years past been divided into two great camps, and we find ranged on one side the adherents of simple extraction, on the other those who are loyal to iridectomy. The former had an eloquent advocate at the Seventh International Congress in Dr. Gayet of Lyons who was ably seconded by Dr. Knapp of New York whilst the merits of the combined operation were then brought forward with corroborative statistics by Professor Graefe of Halle, and afterwards at one of the meetings of the Society by Dr. Swanzy in an admirable paper. My own views on the subject are, I think, well known but they must find no utterance now; for to-night I appear not as the strenuous advocate, but as the impartial historian.

The limited time at my disposal has barely sufficed for a rapid and I fear very imperfect retrospect of a most interesting subject. To some of my hearers who, like myself, are beginning to earn the title of veteran, I owe an apology, for I have doubtless alluded to facts with which they have long been familar; but our Society is, I am glad to say, rich in young and earnest recruits, and I venture to hope that the brief glance which I have taken at an important section of ophthalmic history may to them be not altogether unwelcome. Those who some thirty years ago were fortunate enough to witness the skilful operations performed both in the United Kingdom and on the Continent by the great ophthalmic surgeons of those days might well have seemed justified in a belief that the acme of perfection had been reached, and that further improvement was impossible; but the advances made since then, in which cocaine with antiseptic and aseptic surgery have played so large a part, have been most encouraging; and it is in no boasting spirit, but with

a feeling of thankfulness, that we compare our results with those of our predecessors.

In the hope, therefore, that our future may be one of scientific progress, let us retain an open mind and a well-balanced judgment, keeping steadily in view our final goal, the relief of human suffering.

ON VISUAL SENSATION,

BEING

THE BOWMAN LECTURE,

Delivered on Friday, June 15th, 1900.

By R. Marcus Gunn, M.A., M.B., F.R.C.S.

Mr. President and Gentlemen,—I have in the first place to thank the Council of this Society for the great honour they have paid me in their invitation to deliver this lecture; and I can assure you of my grateful appreciation of the opportunity thus afforded me of taking, for the once, a privileged part in this our tribute to the memory of William Bowman.

I think it may be useful to devote this Bowman Lecture of 1900 to a short review of the present state of our knowledge regarding *visual sensation.* The nineteeth century has seen much time devoted by many workers towards the advancement of this department of knowledge. Important additions have been made to our facts in relation to the physics of light; in relation to the anatomy—human, comparative, experimental, pathological, and developmental—of visual organs, their central representation, and the connecting apparatus; and in relation to the changes that are associated with the action and appreciation of light in the peripheral and proximal parts of the visual path. Moreover, there has been a great

accumulation of relative observations, that still await a satisfactory explanation.

The area covered by the subject is very wide, and belongs not to one, but to several regions of research. In this review I must crave you leniency, in as far as I shall require to pass over much familiar ground; my aim is to mention briefly the known facts bearing upon the subject, and to indicate how far they help to explain the phenomena of sight.

The subject of visual sensation naturally demands several distinct series of observations, concerning, *first*, the nature of the stimulus that excites vision; *second*, how this stimulus affects sentient cells, and what is the possible nature of the origin of a visual nervous impression; *third*, the path and mode of conduction of the nerve impulse; and, *lastly*, the ultimate appreciation of the conducted impulse.

I. First, then, as to *the nature of the stimulus*. The undulatory theory of light has undergone modifications in some important respects, in keeping with recent physical research. The expression "*ether wave*" must not be held to necessarily imply any actual movement of the ether, but rather an *influence*, a rapid periodic change of some of its properties, the term "wave" simply meaning a disturbance of definite periodicity in space and time.* Of the ether itself little is known positively, except that it is the *something*, present throughout space, which affords the opportunity for the occurrence of the disturbance known as "ether waves." Concerning these waves, however, we are in a position to speak more positively.

From every great centre of energy (the sun being, of course, the most important to us) radiations of energy take place, and pass through space in the form of these ether disturbances. So far as is known all such radiant energy travels at the same rate, and the "waves" occu

* See 'The Theory of Light,' J. Preston, 1895, pp. 537 *et seq.*, and 'Light Visible and Invisible,' Silvanus P. Thompson, 1897.

transversely to the direction of propagation of the force. As to the nature of the vibrations or disturbances in the ether, the view now held is that suggested by Faraday, and elaborated later by Clark-Maxwell, viz. that they are *electro-magnetic*. To express the view in general terms, all radiation-effects (including those of light) are due to rapid, periodic changes of electro-magnetic properties possessed by the ether.* The importance of this to us lies in the fact that we have to regard our stimulus, not as due to mechanical displacements, but as dependent on rapidly successive electrical disturbances. The length of the wave, that is the interval between the disturbances, varies exceedingly. It has been recognised so great, on the one hand, as to measure many yards; while, on the other hand, it may be so exceedingly minute that it occupies only four or five millionths of an inch; that is, from the Hertzian waves on the one hand, to the smallest known so-called 'chemical waves' on the other. But all these waves, whatever their length, possess certain familiar physical properties in common: they can all be reflected, refracted, absorbed, and polarised. As they all travel at the same rate, given the length of the waves of any particular series, we can readily calculate the number of them that will impinge in a given time upon an object lying in their path. It is, in all probability, this rapidity of succession of the waves, rather than their lengths, that determines the difference of the physiological effect produced when they fall upon living matter.†

* Bodies that are conductors of electricity absorb such radiations rapidly, and are therefore opaque, while those that are transparent to light are insulators.

† The longest waves (electric or Hertzian) can only be recognised by an apparatus specially adapted for the purpose, are not appreciated directly by man, and so far as we know produce no direct effect upon our bodies. It is only when their lengths are very greatly shorter, and therefore when they possess a much higher frequency, that the waves begin to be appreciated by us by their exciting the sensation of heat. The maximum heat-effect is produced by waves of a length of about 40 millionths of an inch, and a frequency of about 294 billions per second. When the waves attain a still higher frequency, viz. about 360 billions per second, they first begin to excite

The human retina is influenced by a comparatively short part of the entire scale, corresponding to what may be called an "octave" (that is, the shortest visible waves are approximately half the length of the longest visible); while on either side of these there are several "octaves" of invisible waves, either too long or too short to be appreciated in this way.* In our consideration of the visible radiations, I need not remind you that different rates of frequency (or different wave-lengths) in some way or other produce different effects on the retina of many, probably of most, animals; and that these effects are instrumental in exciting in man a definite series of colour sensations. It should be observed that those radiations which produce the greatest light-effect are nearly, if not exactly, midway between the two extremes of frequency.

We must bear in mind the fact that the same ether wave which excites a sensation of *heat* in the skin, might cause a sensation of *light* were it to fall upon the retina: this is particularly the case at or near the red end of the spectrum. In fact, speaking strictly, there are no such things as heat waves and light waves. To quote the words of the late Professor Preston, "It is not that there are two classes of waves, heat waves and light waves, but that we have two senses by which we can detect the same waves."†

the human retina, and then only to a very feeble degree. The effect on vision increases until the frequency attained is about 535 billions per second (or 22 millionths of an inch wave-length). But as the frequency becomes greater than this, the effect on vision diminishes, until it finally dies away when the frequency exceeds somewhere about 760 billions per second. Waves of higher frequency, though invisible in themselves, may make their presence visually effective indirectly, by producing in certain substances the property of phosphorescence or of fluorescence, but this really depends on these ultra-violet waves being transformed into waves of greater length. The ultra-violet waves are of great chemical activity, and can produce physiological effects on animal and vegetable tissues. The maximum chemical effect in certain tests is said to occur with a wave-length of about 16·5 millionths of an inch (or frequency of 714 billions per second), which is within, but very near the limit, of the visual radiations (in the blue-violet).

* Cf. Thompson, op. cit., p. 197.

† Op. cit., p. 41. Sir William Gowers, 'The Dynamics of Life,' p. 42

To afford a conception of the length of a visible wave that will be more readily grasped than when it is expressed in the usual form, I may observe that the length of the wave corresponding to extreme red (thirty-two millionths of an inch) measures about one tenth the diameter of a red blood-corpuscle, and that of violet, therefore, about one twentieth. In passing, I would here remind you that there is every reason to believe that, in certain lower animals, radiations are visually effective which are to us invisible; this has been observed to be particularly the case with the shorter ultra-violet waves.

II. *How does the physical force of the radiations affect visual cells?* It will be noted that in this part of our inquiry we are not concerned with light sensation, and still less with perception.

As a preliminary to this investigation we must inquire first, what evidence, if any, exists as to the action of light on living cells that cannot be regarded as subserving any visual function. And if such evidence can be produced, what are the changes brought about in this way?

As to the existence of such evidence there can be no question; and perhaps the most familiar examples are those presented by plant life. Thus in the leaf of a plant that has been kept for some time in the dark, the chlorophyll corpuscles are found collected upon the lateral and lower cell-walls, whereas in diffuse daylight they collect on the *superficial* walls of the cells, *i. e.* on those next the light* (see Fig. 1).

This change in the position of the chlorophyll bodies is attributed to movements of the protoplasm.

Under the influence of light on the chlorophyll, also, a chemical effect of vital importance to the plant is brought about, viz. the construction of carbohydrate substances from carbon dioxide and water.†

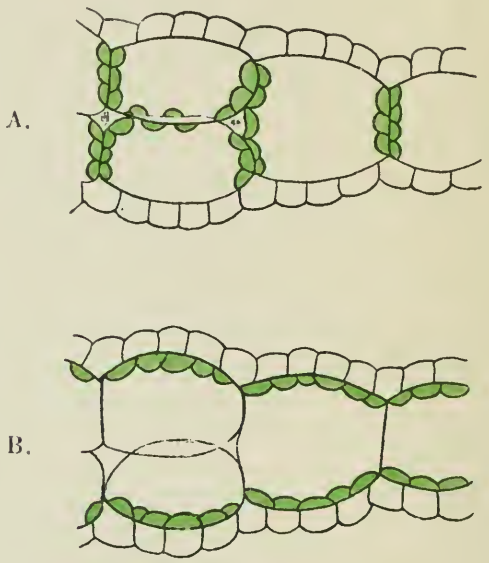
expresses the same idea in terse language, "In the red rays of the spectrum we actually feel light by the skin, and see heat by the eye."

* 'Lectures on the Physiology of Plants,' by S. H. Vines, p. 299.

† All wave-lengths have not an equal action on chlorophyll. In the case

Let us take another illustration from plant life. Certain desmids of elongated form kept in a glass vessel have

Fig. 1.



Shows the position of the chlorophyll corpuscles in the cells of a leaf, (A) in the dark, (B) under exposure to diffuse daylight (after Stahl).

been observed to wander towards the light, and to attach themselves to the side, so that their long axes coincide with the direction of the incident light.* Here we have evidence of movement and of a definite *arrangement* due to light.

of *green* cells, the most active rays are those at the junction of the red and orange (between the lines B and C) and again those in the blue just beyond F. It is found that these correspond with the best-marked absorption bands in the chlorophyll spectrum, so that the amount of absorption is a direct indication of the chemical effect produced; in other words, the arrested kinetic energy of these rays is rendered serviceable in the work of metabolism. For a similar reason, in the case of *brown* plant-cells, the greatest activity is found in the rays between D and E, with a second maximum effect between B and C. See Vines, op. cit., pp. 254 *et seq.* For different theories of the nature of chlorophyll photosynthesis, see 'Introd. to Vegetable Physiology,' by J. R. Green, 1900.

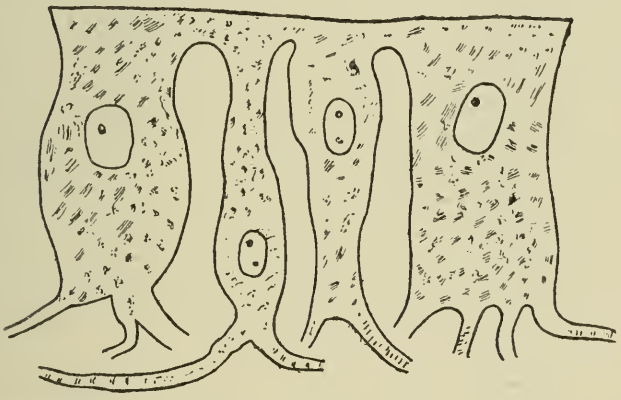
* Stahl, reference in 'Journ. Roy. Mic. Soc.,' 1879, p. 37. Original article in 'Verh. Phys. Med. Gesellsch.,' Wurzburg, xiv, No. 7, and 'Hedwigie,' xviii, 1879, p. 100.

For other examples of the action of light on plants, I might refer to my

There have been fewer observations of the direct influence of light on simple contractile animal protoplasm, but its effect has been noted on a low fresh-water amœboid organism (*Pelomyxa palustris*), which contracts into a round lump on being suddenly illuminated.*

It has been observed, again, that the *hydra viridis*, although destitute of any truly specialised nervous system, and without any vestige of an organ of sight, is attracted towards the light. It is interesting to note that its epithelium shows the dawn of specialisation, and has been called "neuro-muscular," from the fact that the individual epithelial cell receives impressions on its free surface, and transmits them through the body of the cell to deeper-lying horizontal processes (see Fig. 2), which latter are in

FIG. 2.



Neuro-muscular epithelium of Hydra (after Kleinenberg).

this way induced to contract as a result of external stimulation.† Why light should act in this case as an external stimulus to the epithelial cell remains a question for consideration. It is possible that the effect thus produced

paper "On the Nature of Light-perceptive Organs and of Light and Colour Perception," 'Roy. Lond. Oph. Hosp. Reports,' vol. xii, 1888.

* Engelmann, "Uber Reizung contraktilen Protoplasmas durch plötzliche Beleuchtung, 'Onderzoek. ged. in het Physiol. Labor. der Utrechtsche Hoogeschool,' v, p. 181.

† See 'Textbook of Comparative Anatomy,' by Arnold Lang, transl. by H. M. and M. Bernard, part i, p. 46.

in the green hydra is dependent on the known presence of *chlorophyll* in its cells. Indeed, it has been comparatively recently found by Geddes, that chlorophyll, when present in an animal tissue, causes a decomposition of carbon-dioxide under the action of light identical with what takes place in plants. One is encouraged, therefore, to regard the effect as actually due to this chemical decomposition, or, perhaps, rather to the oxygen freed as one of its products.

Again, in certain free-moving infusoria we meet with little aggregations of pigment—the so-called eye-spots,—and it is undoubted that these "eyed" unicellular infusoria are readily influenced in their movements by light. In one of the most remarkable of these (*Euglena*) the pigment seems to be closely allied to chlorophyll. In this instance the movement of the free cell is doubtless due to the effect of light on the protoplasm, induced, or at any rate increased, through some effect on the pigmentary deposit, and very possibly due to a chemical change of the same kind as that just mentioned. This pigment spot can only be regarded as allied to an eye in so far as it appears to be influenced by light, and seems to determine the direction of motion, and the *Euglena* affords simply an example of a very active effect produced by light in a free cell.

The phenomena produced by light in living cells of no visual function may, therefore, be stated to be:—(1) *movement of chlorophyll corpuscles,* probably associated with protoplasmic currents; (2) *chemical activity,* produced in chlorophyll-containing cells of plants and animals; (3) *contraction of protoplasm.* To these we may add (4) *phototaxis,* which is expressed in two ways:—(*a*) the wandering of free cells towards the light, and (*b*) the position assumed by the cell, namely, parallel to the axis of the incident light.

We have so far, with the possible exception of the "eyed" infusoria, been considering instances where there

has been no local specialisation to favour the activity of the light rays. The question presents itself, What is the visual form of a light-sentient cell? The earliest appearance of what can be called a visual organ is produced by a simple modification of surface epithelium. And here I may say at once that this mode of specialisation holds good universally, and that all light-sentient cells are modifications of surface epithelial cells, or developed from the same embryonic layer which forms these cells.

It would be out of place here, and would demand much more time than is at my disposal, to trace the modifica-

Fig. 3.

Fig. 4.

Fig. 3.—Pigmented retinal cell, ending in conducting fibre. (From a gasteropodous mollusc.)

Fig. 4.—Retinal cell of annelid (Alciope) showing (above) the clear cuticular prolongation. The pigment is chiefly contained in a separate cell.*

tions which the visual cell undergoes in the different animal groups. I may remark, however, that in every

* See 'Untersuchungen über die Alciopiden,' by R. Greeff, Nova acta Leopold, 1876. See also "Voyage of H.M.S. Challenger," vol. xii, p. 178.

class of the animal kingdom in which true eyes are found examples are presented showing a high ocular development, with a correspondingly high type of visual cell.

The general characteristics of such a visual cell are: —(*a*) the end of the cell, corresponding to the cuticle, has a prolongation, usually in the form of a rod; (*b*) the opposite end of the cell is either directly continued as a conducting fibre, or is connected with a ganglion cell, and ultimately with a nerve-fibre; (*c*) pigment is present in the light-percipient cell itself, or in a distinct closely-related cell; often in both (see Figs. 3 and 4). It is to be noted that the main deposit of pigment is usually of a brown colour, and that it is situated at the end of the cuticular prolongation furthest removed from the incident light, both in invertebrates and vertebrates.*

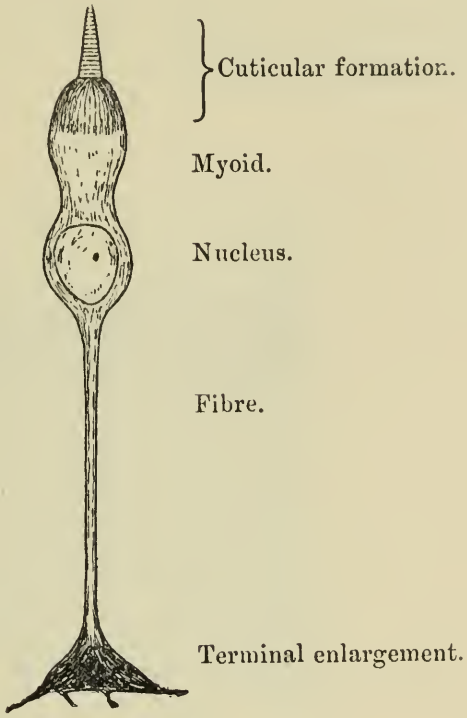
In the vertebrate retina we have, first, the *pigment epithelial cell*. This is of comparatively large size, so that in man each cell has several end-organs embedded in it. The outer part of the cell is colourless, and contains the nucleus. The remainder of the cell-body possesses much pigment, principally in the form of needles or crystals, called *fuscin*. From the inner or cuticular surface of the cell arise numerous fine processes, which pass inwards for a considerable distance between the end-organs. They are colourless or contain pigment, according to previous conditions as regards shade or exposure to light.

Secondly, the neural or *visual epithelial cells* are in most vertebrates of two kinds, named, from the shape of their outer segments, rods and cones. Each cell is much elongated in a direction perpendicular to the free surface of the retina; and while its outer extremity is more or less deeply imbedded in the pigment epithelium, its inner end rests on the outer plexiform layer. Each may be divided primarily into cell-body and cuticular formation. Under this latter term are probably to be included not

* This holds good irrespective of the fact that the visual cells are turned towards the light in invertebrates, and away from the incident light in vertebrates.

only the outer segment, but also the highly refractive outer part (so-called ellipsoid) of the inner segment. The cell-body, traced from the cuticular end, begins as a distinct granular protoplasmic swelling, called the "myoid;"

FIG. 5.



Cone-cell of human retina.

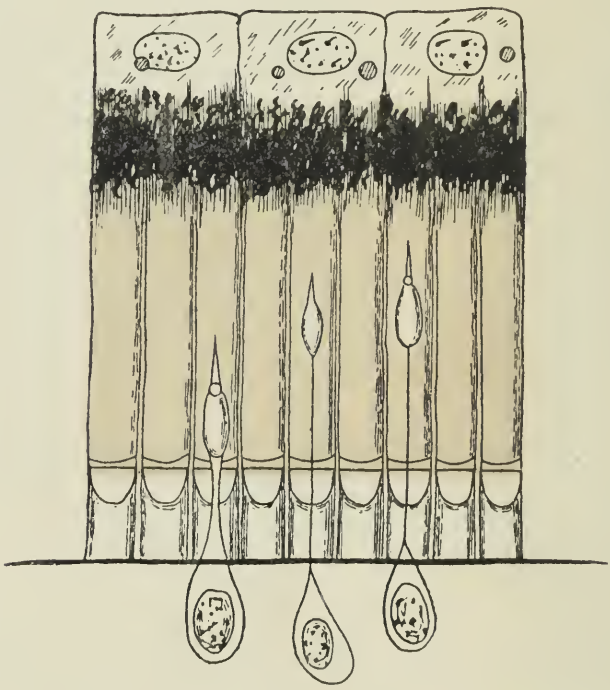
then (immediately in the case of the cone, after a varying interval in the case of the rod) comes the nucleus or granule. Next there is a constricted part of the cell known as the fibre; and, finally, the fibre-bulb or enlargement (see Fig. 5). The relative size of rods and cones varies greatly in different vertebrates; but, when both elements co-exist, the chief distinctions between them consist in the greater development of the myoid in the cones, and in the fact that the outer segments of the rods have, with few exceptions, a uniform reddish-purple colour under ordinary circumstances during life.

We now come to the most important question included in this division of our inquiry, namely, What are the

evidences of effect produced on such specialised light-sentient cells by the action of light? Observations on this matter have been mainly conducted on the eyes of vertebrates, and I shall confine my remarks to the effect produced on this most highly developed form of retina.

First, on *pigment-epithelium*.—In the pigmented cells, when at rest, the fuscin is collected in a close mass in the body of the cell (Fig. 6).

Fig. 6.



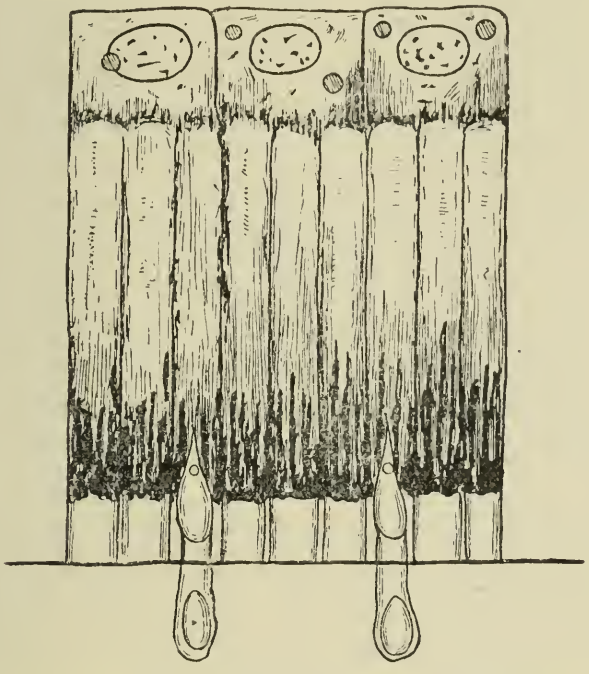
Frog's retina in "dark" condition (after v. Genderen-Stort).

When stimulated by light (*a*) the long pigment particles wander forwards—that is, towards the light,—and invade the processes which extend between the outer segments, reaching nearly up to the external limiting membrane (Fig. 7). This migration seems to be due to, or at any rate associated with, currents in the fluid cell protoplasm. Marked wandering of the pigment takes place in red light, but the movement is most active towards the violet end of the spectrum, and the activity seems, roughly,

to be inversely proportional to the wave-length. The addition of carbon dioxide to the inspired air causes migration of pigment even in the absence of light, and this fact should be remembered. Once the pigment is in the forward position it returns to the body of the cell very slowly in the dark.

(*b*) Also caused by exposure to light, we have swelling of the pigment-cell processes, which consequently grasp

Fig. 7.



Frog's retina after exposure to light (after v. Genderen-Stort).

the outer segments. In this way the retina, over an illuminated area, is made to adhere to the pigment epithelium, forming what has been called an epithelial optogram.

(*c*) Yet another effect from light is the alteration in the reaction of the contents of the pigment cell. This seems to be an oxidizing process, accompanied by the substitution of an acid for a previously alkaline reaction ; and there is reason to believe, from the action of staining fluids, that the change in reaction is communicated to the rods and

cones, and that the activity of the chemical change varies in amount according to the wave-length.

Second, *in the visual epithelium* there are several important changes brought about by exposure to light.

(*a*) *Effect on the retinal purple.*—The purple of the rods undergoes change of colour wherever the light falls on the retina, and this action is strictly confined to the illuminated area. The red end of the spectrum has but little effect, and the most active wave-lengths are those that correspond to the yellowish-green, which are the waves chiefly absorbed. Absolute bleaching ultimately takes place, the rapidity of the process depending upon the intensity of the light. The purple is slowly restored in darkness if the rods remain in contact with the pigment epithelium, so that the formation of the purple stain is evidently dependent upon some action in the pigment cell, presumably of a secretory nature.

(*b*) *Movement of the cone.*—While a cone protrudes well into the pigment layer when protected from light, it retracts rapidly on exposure, the contraction taking place in the cone-myoid. The shorter wave-lengths act most energetically. It would seem to be an illustration of movement caused in excitable protoplasm by light. Similar but more feeble movements have been described in the rod-myoid, due to the same action (see Figs. 6 and 7).

(*c*) *Photo-electrical response.*—It has been conclusively demonstrated that the action of light upon the retina is accompanied by a marked electrical change. The current so induced travels from pigment epithelium to nerve-fibre layer, is positive in character, and is ascribed to increased disintegration.*

On exposing a fresh eyeball to light there is first a very short pause, followed by a rapid rise (or positive deflection); with continued illumination the positive effect increases slowly or remains stationary; and on shutting

* A. D. Waller, "On the Excitability of Nervous Matter, with especial reference to the Retina," 'Brain,' part 1, 1900.

off the light there is a further short sharp rise, succeeded by a gradual fall to the position of rest (Fig. 8). Dr. A. D. Waller has shown that there is evidence of two antagonist processes in every such response, one positive, the other

Fig. 8.

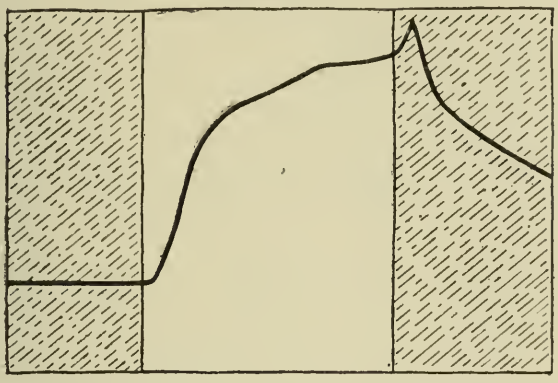


Chart of photo-electrical response in frog's retina (after A. D. Waller). It is to be read from left to right; the unshaded area corresponds to the time of illumination.

negative, the positive effect being dominant in the case of the fresh eyeball, the one possibly an evidence of disintegration, the other of reintegration. Very weak illumination —*e. g.* moonlight—suffices to produce the electrical variation.

It has been repeatedly asserted that the electrical change depends upon the retina proper, and is independent of the pigment epithelium. This, however, seems to me to require further investigation. It is difficult to believe in a marked change of this character being produced by light without the presence and participation of the pigment epithelial cells, in which there is every reason to think that the light energy is mainly arrested and transformed.

According to Dewar and McKendrick white light is the most effective; but, on examining with spectrum colours, their observations seemed to show that the yellow rays have the greatest power, and that there is a gradually diminishing action on either side of the yellow. These observations on the activity of different parts of the spectrum are, however, open to the objection that the

difference in response depended on the intensity rather than upon the wave-length. If the electrical change is due to the effect of light on the pigment cell we should presumably have the greatest action from that part of the spectrum that is brightest at very low intensities.

If we now compare the evidences of the effect of light on visual and on certain non-visual cells, we find a striking similarity. In both there is a *marked stimulation of the cell-protoplasm, combined with chemical activity;* and in the case of the visual cell the amount of effect seems capable of measurement by the galvanometer.

[Since writing this paragraph, I find that Dr. Waller has just brought forward evidence to prove that the light-effect upon a fresh leaf is also accompanied by an electrical change, thus completing in a remarkable manner the parallelism here described.]

III. *Conduction of the impulse.*—The simplest example of the conduction of a light effect in an individual is in the case of a unicellular organism, such as the Euglena, where the whole cell responds to the influence communicated to it from without.

Allusion has been already made to the neuro-muscular cells found in the hydra, where the irritation is conveyed directly from the free surface of the cell to its deeply lying processes, which are in this way stimulated to contract. Here, again, we have the excitation confined in its effects to a single cell; but in this case the cell is *fixed,* and other similar cells lying by its side are similarly affected, so that the area of induced contraction is relatively large.

The observations of Dubois on the action of light upon the integument of the siphon of *Pholas dactylus* are important in this connection. The superficial epithelium is here pigmented, and immediately beneath it there occurs a fine layer of contractile fibres, which in turn overlie nerve-cells, and these, again, are connected with the longitudinal muscle which moves the siphon. On

exposure to light, the subepithelial muscular fibres contract, and following this there is contraction of the muscle of the siphon, brought about, doubtless, through the mediation of the nerve-cells. Here, then, we have an instance of a photo-chemical change in the pigment cell causing movement of the subjacent contractile tissue —so far, therefore, similar to what occurs in the hydra,— but in the pholas this superficial contraction is reputed to act as a mechanical irritant of the nerve-cell, and thus occasions the general muscular movement of the siphon. This, of course, is not *vision*, at least certainly not *conscious* vision, but it is an effect, apparently purposeful, produced locally by light without any appeal to a central nerve mechanism.

Other examples might be adduced where much more highly specialised light-sentient structures are of local service, but which are equally unconnected with visual perception. The effect desirable (which is usually, in lower forms of animal life, escape from danger or search for food) may thus be brought about by a local effect from light. But a multiplicity of such sensitive areas is manifestly necessary where the body to be protected is large. It is evident, therefore, that to secure the result with the minimum of specialised tissue it was necessary to have the sense organ associated with a central nervous mechanism.

We get a local combination of many light sensory cells to form a visual apparatus, and a union of many ganglion cells to form a central nervous mass. The sensory cells may be situated directly on a small collection of nerve-cells, but more frequently, and constantly in the case of higher forms, these are connected by intermediary ganglion cells, which are also presumably formed, like the sensory cells, from certain of the epithelial cells, but at a later period. Such an explanation may sound somewhat theoretical, but it nevertheless rests on strong biological evidence, and is supported by the developmental changes which occur in the ectodermal cells forming the

inner division of the secondary optic vesicle of verte-
brates. In this latter instance, for example, we have at
first a single layer of columnar cells; but these, by their
multiplication, soon become arranged in three definite
superimposed layers:—the outermost (corresponding to
the position of the original ectodermal cells) constituting
the true sensory epithelium; the innermost, the large
ganglion cells; and the intermediate layer, the connecting
bipolar ganglion cells or inner granules.

This leads us to inquire how nerve-cells are connected
with each other.

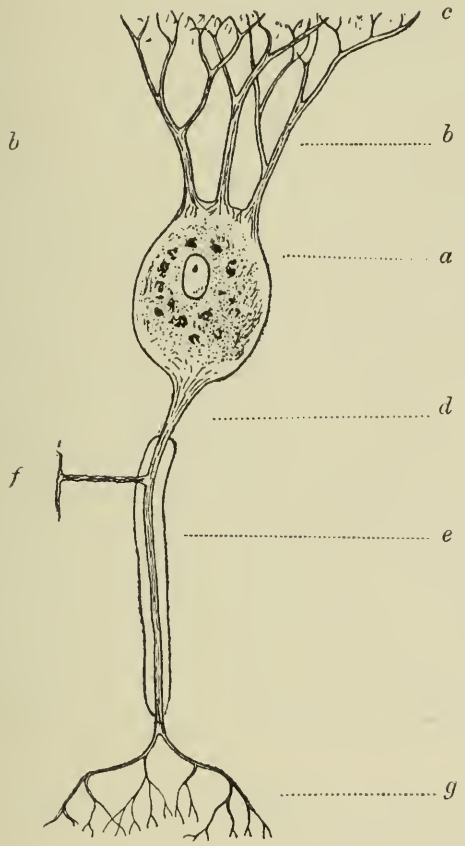
According to comparatively recent teaching, each
nerve-cell is an independent anatomical unit, or neurone,
and there is no continuity between it and the next in the
line. The axis-cylinder of a nerve-fibre, however long,
is a branch of such a cell. Fine terminal divisions of
the axis-cylinder process of one cell come into indirect
relation with the ultimate branchings of the protoplasmic
processes of the next cell in the same path, and con-
duction of the nerve-wave takes place by the *contiguity*
of these nerve-endings in the nerve feltwork so pro-
duced (Fig. 9).

Still more recently, however, doubt has been thrown
by several observers on the strict accuracy of the
"*neurone theory*," as it is termed. Perhaps the best
known and most subversive antagonistic theory is that
advanced by Apathy, from observations on invertebrates,
namely, that the true conducting anatomical unit is a
primitive *fibril*, which pursues uninterruptedly a very
long course from the sensory cell from which it originates
to the ganglion cell which it traverses, and whence it
passes to a second and to a third ganglion cell, and can
sometimes be observed finally to enter a muscular fibre.
The primitive fibril, or neuro-fibril, is to be regarded as
belonging to a distinct variety of nerve-cell, and each
fibril is itself made up of several closely lying elementary
fibrillæ, only recognisable as distinct when they separate
in the interior of the ganglion cell, or at the termina-

branchings. A ganglion cell process, *e. g.* its axis cylinder, contains a number of neuro-fibrils.

Other observers, again, while assenting to a possible continuity, maintain that the fibrillar appearance is due to folds produced by reagents in the wall of a very fine

Fig. 9.



Diagrammatic representation of a neuron: (*a*, ganglion cell; *b*, *b*, protoplasmic processes or dendrons; *c*, dendrites, forming part of felt-work; *d*, axis-cylinder process or axon; *e*, medullary sheath; *f*, collateral; *g*, axites.

tube—that, in fact, the axis-cylinder contains "primitive tubules" instead of primitive fibrils,—and that each tubule is filled with protoplasm (hyaloplasm). This protoplasmic substance constitutes the instrument by which nerve force is conveyed from one ganglion cell to the next. These last-mentioned theories afford an

acceptable view of a possible unbroken conduction, bu
do not invalidate the nutritional significance of th
neurone unit.

In the present state of our knowledge, or want o
knowledge, as to the nature of a *nerve-wave*, it is not
perhaps, of great importance how the different nerve-
cells are brought into physiological relation with one
another, so long as we are familiar with the general
characteristics and position of the path traversed. The
actual nature of the process associated with progress o
the nerve current would appear to be most easily ex-
plained by supposing that the force, originated, for exam-
ple, in the sensory cell, produces a physical—probably
chemical—effect on the nearest particle of the asso-
ciated nerve tissue, this effect being of such a nature
that it produces, in turn, a similar change in the state
of the particle next in order ; and that so the influence
is passed onwards. In physical language, the nerve-
protoplasm is in a state of unstable equilibrium, and is
consequently unable to maintain its state of rest when
exposed to a very slight disturbing influence. The in-
fluence produced locally seems to be accompanied by
the formation of carbon-dioxide, and the progress o
the impulse along the nerve can be traced by a change
in the electrical condition, known as the "current o
action."

As the wave of change travels along, it leaves the
nerve substance behind it seemingly in the same func
tional state as before the change occurred. This rapid
renewal causes the nerve-fibre to be practically inexhaus
tible, the nutrition of the fibre being maintained by it
relation with the protoplasm of the associated ganglion
cell, aided possibly, in the case of long medullated axons
by the cells of the medullary sheath.

This absence of nerve fatigue, and rapid restoration
of function after temporary change, of course only hol
good where the nutrition of the ganglion cell itself i
perfect. In altered blood-states, as from certain poisons

r in inflammatory conditions, exhaustion readily occurs ndoubtedly, and restoration is often extremely slow, and ay be deferred indefinitely.

Having, then, discussed very briefly the more general uestion of nerve conduction, we are in a position to con- ider somewhat more particularly the features presented y the visual path. An effect having been produced on he sensory epithelial cell, this effect is immediately in- uential as far as the extreme termination of the cell or bre-bulb. From this it is communicated to a bipolar anglion cell (or inner granule), and then to one of he ganglion cells of the ganglion cell layer. Along the xis-cylinder of this last cell the impulse passes as far as he external geniculate body, where this axis-cylinder nds; but the nerve-wave is immediately passed on to nother neurone (the cell body of which is in this situa- ion) and travels along its axon, to have an effect finally pon a nerve-cell of the cortex.

There has been considerable variety in the results btained by different observers regarding the character f the connection between the terminations of each of hese cells, perhaps particularly so regarding that be- tween the fibre-bulb of the sensory cell and the inner granule. Working with his modification of Golgi's method, Ramon-y-Cajal has made many exceedingly im- portant observations upon the anatomy of the retina, and has classified the different forms of cell with a precision that is almost perplexing. It will be sufficient for me here to say that he believes that there is no direct relation, beyond that of mere contiguity, between the bulb and the outer process of the bipolar cell; that, in fact, the relation of the sensory epithelial cell to the inner granule is exactly similar to what he has described as existing between two ganglion cells else- where. Other observers, working by different methods, and one working by the same method, have on the other hand found distinct evidence of a direct anatomical con- tinuity between these elements. Golgi, again, and Dogiel

have described a direct connection between the ganglion cells and the bipolar cells. The question is, as I have previously said, not of essential importance in the present condition of our knowledge. Whether the nerve impulse be communicated by substance that is in continuity, or that is only closely contiguous, the fact remains that the communication does take place, and that the impulse follows the path laid down by the chain of neurones. Many (more than twenty) rods, and several cones, may be physiologically connected respectively with single bipolar cells, and several bipolar cells with one ganglion cell. This satisfactorily accounts for the relatively large number of rod and cone-cells in the retina, as compared with the number of fibres in the optic nerve. The cone-cells of the fovea appear, however, to be exceptional, in that each has only one bipolar cell and one ganglion cell in relation with it.

What conjecture can we form with regard to the origin of the visual nerve impulse? It may be argued that, in as far as the wave force which excites the retina is electrical, the nerve impulse may be simply a continuation of the same force. This, however, cannot be accepted, because, to mention one reason only, the energy in the case of an electrical ether wave travels at a rate almost immeasurably greater than that of a nerve current.

It is certain that the energy contained in the light wave, must undergo a profound change when it strikes and is arrested by the pigment, and the change that first suggests itself is, that heat should be in this manner produced. It is quite possible, nay, even probable, that a certain amount of rise of temperature takes place in this way, and this would be instrumental in the promotion of the currents in the cell-protoplasm. It might be objected, that, were the change largely of this nature, we should have an influence produced by so-called "heat-rays" that are invisible. It is known, however, that only a

small percentage of the infra-red rays which strike the cornea ever reach the retina.

But, due to this transformed energy, brought about by the arrest of light in the pigment, there is every reason to believe that there are *chemical changes* induced in the pigment cell, which changes should be compared with those brought about in plants by the action of light on chlorophyll. These chemical changes are also probably factors in the promotion of protoplasmic movement. In the case of chlorophyll, the wave-lengths that are mainly arrested are the most chemically efficient, and this probably holds good also in the case of the retinal pigment.

The pigment cell when at rest has a marked secretory function, evidenced by the formation of retinal purple in the rod outer segments. The material thus formed is undoubtedly of great visual value, though there is no conclusive proof that the purple stain itself has actually any direct influence on sensation. Although complete rest, that is darkness, causes an accumulation of this secretion, the function proceeds during exposure to light.

The next fact of importance in this consideration is the contraction of the cone-myoid, which may be either due to a direct action of light on protoplasm—comparable to what has been observed in the amœboid organism previously referred to, for example,—or to a change produced indirectly, the cone-myoid contracting in consequence of some stimulus, possibly chemical, received from the pigment-cell.

Prolonged exposure to an intense illumination, *e. g.* direct sunlight, causes actual changes of so pronounced a character that the outer segments of the visual cells are altered anatomically as well as functionally; and this alteration may persist for many months, or even remain permanent. The nature of the force which causes these changes is not determined, but may be a powerful oxidation, the outer segment being, as it were, chemically cauterised.

The fundamental idea of vision seems to be to connect visual impression with muscular action, so that the animal may move out of danger, protect itself, or find its food. There is no necessary consciousness associated with any such visual influence, even in the case of animal forms where different wave-lengths produce a difference in the muscular movement induced. In the case of the *Daphnia*, for example, the experiments of Lubbock demonstrated that this tiny crustacean, with its feebly-developed nervous system, is capable of distinguishing between light of different wave-lengths, and that it is influenced particularly by the rays that correspond to what we know as yellow and green. It is unnecessary, and surely unreasonable, however, to conclude that the daphnia has any real conscious vision, as we understand it in ourselves, still less a true colour sense.

As an instance of how eyes may be developed and prove serviceable for the production of a muscular action beneficial to the individual, no better could be brought forward than that observed by Semper in the *Onchidium*.* This animal is a land-snail which lives close to the sea-shore ; and the same shore-area, on certain coasts, is the hunting ground of numerous specimens of the *Periophthalmus*, a fish which leaves the water in search of food, and shows a marked partiality for this mollusc. Now, on shores where there is no periophthalmus to annoy, the snail has a back much like that of any other large slug ; but where it is liable to meet this particular foe, and nowhere else, the local onchidium is found to be possessed of numerous highly-developed eyes—each having retinal cells, pigment, and optic nerve—on its back. It is a slow-moving animal, and the fish is not, so even sight would avail it little were it to endeavour to crawl out of danger on detecting its enemy. In these dorsal-eyed onchidia, however, and in them alone, the skin of the back is

* See Karl Semper, "Über Schnecken-Angen vom Wirbelthiertypus," Archiv. f. mik. Anat.,' Bd. XIV, p. 118. Also 'Animal Life,' by Semper (Nat. Sc. Ser.), p. 372.

hickly set with minute glands, which contain each a con-
retionary pellet. Semper's argument is that, on becoming
ware of the presence of the fish by means of its dorsal
yes, the mollusc quickly draws up its whole body, thus
ontracting the glands in the skin on all sides. The
ellets of secretion are expelled into the air in hundreds
owards the pursuing fish, which is in turn alarmed, and
etires dismayed by the shower of shot with which it is
ssaulted. I must refer you to Semper's work for
he evidence he adduces in proof of his hypothesis, and
or his account of the manner in which the eyes are
radually evolved; and I think after reading them you
vill admit that there is sound reason in what he says. I
hould merely take exception to the necessity of the
nimal being "*aware*," except in the broadest sense. It
s much more probable from the nature of the nervous
ystem and the innervation of the eyes in this instance,
hat the muscular contraction is a mere local reflex, a
mall area being influenced by each eye.

I would also here refer to the protective changes in
olour, from the influence of their surroundings, that
ccur in many animals, particularly in certain fish and
mphibians. The pigment is contained in contractile
ells in the skin, and Lister showed that the activity of
hese cells, that is to say the distribution of pigment in
he skin, was dependent on visual stimulation. Pouchet
ubsequently proved that the reflex took place through the
ympathetic nerves. The more intense the light reflected
rom surrounding objects, the greater the nerve current
xcited, and the more complete the contraction of the pig-
ient-bearing cells. It is not a question of the animal
onsciously assuming a protective shade, but an instance
f a visual impulse provoking a muscular contraction.

As we ascend in the animal scale we get further cen-
ralisation of the nerve mass, and find the visual appara-
us intimately connected with it. Even in the case of
he vertebrate brain, it has been asserted that in all
robability each part was primarily independent, and the

division connected with the optic nerve was one of conspicuous importance. In the lower vertebrates—fishes, amphibians, reptiles, and birds—we still find the central connection of the optic nerves almost confined to one part, the large optic lobes, corresponding to the corpora quadrigemina of mammals. But, as we ascend the scale, this part of the brain becomes progressively smaller and less developed, and seems to be mainly instrumental in the transmission of visual impulses that are to be immediately (that is, without reference to the visual cortex) conveyed as reflexes by way of motor nuclei to muscles, such as those for movements of the iris, and possibly to some extent of the eyeball itself—movements that can occur independently of sensory vision. There is absolutely no evidence that there is any difference in the character of the original impulse, or in the optic nerve-fibres which convey it, to distinguish what will be a mere muscular reflex, and what will be a conscious impression. As to the manner in which such fibres are connected with visual cells, so that there may be, as it were, double central representation (sensory and reflex) of every part of the retinal area, we are still ignorant. It is possible that this is brought about by lateral communications between the processes of retinal ganglion cells of one or other layer, but more probable that it is effected by a collateral from the axon of the last retinal neurone.

The visual fibres, strictly so called, take, at least mainly, another course in the higher vertebrates. In man, for example, they pass from the optic tract to the external geniculate body and pulvinar, and thence the impulse is connected by fibres which traverse the posterior end of the internal capsule and pass, as the optic radiations of Gratiolet, to the cortex of the calcarine fissure and its immediate neighbourhood. The crossing of the optic nerve-fibres at the chiasma, so as to produce unilateral representation of the corresponding half of each retinal field; the bilateral representation of each macula; the association fibres which bring the cortical

egion of visual projection into relation with the much nore extensive area of visual representation; the question f a distinct unilateral representation of each ocular isual field; and the arguments for and against a eparate cortical area instrumental in colour perception, I nust leave with a bare mention. These are matters vhich, where proved, are familiar to you all, and where till merely subjects of speculation demand further esearch. Nor do I consider that their discussion aturally comes under my present subject.

As regards the receiving apparatus there is not very nuch to be said definitely. The visual fibres end by ommunicating, directly or indirectly, through a nervous elt-work, with cells of the visual area, and destruction f this part of the cortex causes immediate blindness of corresponding part of the field of vision. It would ppear that the upper and lower lips of the calcarine issure of one occipital lobe correspond respectively to he upper and lower parts of the homonymous halves of oth retinæ, and that the fovea is represented along the ntire length of the fundus of the fissure. But whether he cells of the calcarine cortex are the seat of conscious mpressions, or merely constitute a stage in the path to et higher centres; and whether the same cerebral cell is apable of appreciations of differences in colour as well s of difference in amount of light effect, must remain lebatable questions. So much only may be observed, hat this part of the cortex is particularly rich in cells, nostly of small size, while there is no reason to regard a mall nerve-cell as inferior to a large one in functional ctivity.

IV. I wish to say what must be a few words regarding he broad facts of our *recognition of the conducted impulse*.

On looking at the ordinary solar spectrum, we observe hat there is a gradation of colour associated with different wave-lengths, and also that there is a *varying rightness* of the light effect in different parts of the

spectrum. We have thus evidently two distinct sensations dependent upon light, *colour* and *brightness*, both influenced by differences in wave rapidities or wave-lengths.

On gradually reducing the intensity of the spectrum the colours fade and finally cease to be recognisable, but not simultaneously. The red effect is recognisable so long as any light is apparent at this end of the spectrum, and on still further reduction of intensity *all coloration disappears*, and the whole spectrum becomes grey.

In this colourless spectrum the brightest part is slightly to the violet side of the line E. We see, therefore, that of these two sensations, light and colour, that for light is the one that persists with the smallest recognisable stimulus, and is presumably the more elementary. And, if we may follow the same line of argument further, the most elementary visual sensation of all is that derived from waves near E, namely for *green*. Clinically we have additional proof of this difference, for example in cases of optic nerve disease with failure of conduction, when colour sensation disappears before that for light. Moreover, in the case of total congenital colour blindness, the brightest part of the spectrum is also in the green, about the line E, just as we find it to be on sufficiently diminishing the intensity of the solar spectrum to the normal eye. In fact, the appreciation and conduction of the stimuli associated with colour sensation seem to be more delicate than for light; a greater stimulus is needed to excite it, and it is more readily affected by any failure in the conducting path. The difference between these two sensations, light and colour, is much more marked with certain wave-lengths than with others. For example, in the case of the longest visible waves, they become recognisable as a colour (red) practically at the same time as they become visible as light, while in the case of shorter waves near E (green) there is a marked interval between the intensity necessary for the perception of light and that necessary for the

ecognition of colour. Green, indeed, affords us the est clinical test in the diagnosis of early failure of conuction, the appreciation of the colour failing, while that or light persists.

The question arises, are these two distinct sensations ependent on unknown changes, mainly central, or can hey be in part accounted for by recognised peripheral, *e.* retinal processes? That the actual perception of ifferences in colour and in illumination is a cerebral rocess is undoubted, but it is equally certain that some etinal variation corresponding to the influences of different timuli must pre-exist. There is abundant evidence, I hink, that light perception is the more primitive, and he primitive type of visual cell is pigmented epithelium. Ve are encouraged, then, to regard this part of our etina as probably mainly concerned in the peripheral ppreciation of light as distinguished from colour, and nany facts support this view. For example, in cases of isease of the pigment epithelium there is, we know, narked difficulty in appreciating differences in the amount f light. Again, if the eye be kept in the dark for a onsiderable time, say an hour, it is found that the igment in the epithelial cell takes up what is known s the 'dark position,' and that there is a marked staining ith retinal purple of the outer segments of the rods. his we know from investigations on the eyes of lower ertebrates. Now, if we subject one or both of our own yes to the same test, until the retina is in the condition f "dark adaptation," and the above-mentioned changes ave presumably occurred, it is found that there is a emarkable increase in the facility with which we can ppreciate mere differences of light, and the actual hreshold for light appreciation is found to be very many imes less than what it is under ordinary illuminated onditions, or, in other words, the sensitiveness of the etina for light is very much *increased.*

I think we may accordingly venture to infer, that the hemical action induced by light on a particular secretion

of the pigmented epithelium is intimately associated with the causation of the effect recognised as *light sense;* and our next step is to inquire how the impression is conveyed from the pigment cell—that is to say, whether it is by rod and cone cells indifferently, or mainly by one of these forms. Although the power of appreciating a faint light stimulus is so markedly increased as a whole by "dark adaptation," we find that this does not apply to the entire visual field, and does not apply equally to all parts of the field where it is increased. Thus in the central area the light sense is actually diminished under these conditions; and, whereas it is increased outside the central area, it is relatively more augmented as we approach the periphery. That is to say, it is not increased at all where cones alone are present, and the increase becomes more marked as the rods become more and more the predominant element. It has, therefore, been argued with reason that the rods are the elements concerned in the appreciation of light, or rather of the change produced in the pigment cells by light while the eye is thus adapted; although whether or not the retinal purple is visually concerned may be considered an open question. So definite is the physiological area of diminished light-sense in this condition of "dark adaptation," that it can be shown to correspond with the projection of the rod-free foveal retina. The only possible argument that seems capable of being adduced against the necessity of the conclusion thus arrived at is, that there may possibly be a difference in the behaviour of the pigment cells themselves in the central and peripheral regions of the fundus; but no evidence in favour of this has ever been brought forward.

Granted, then, that the rods have this particular function, it by no means follows that the cones are not serviceable in the appreciation of light in ordinary illuminated conditions, though their peculiar office is presumably concerned with the recognition of differences of stimulation associated with variations in wave-length

recognised as colours. Indeed, we know that light is ordinarily appreciated with marked efficiency by the macular area, but it is possibly *always* in virtue of the same function that is concerned in colour vision,—white light being recognised, not as a simple result of stimulation, but as a consequence of a combination of (say) three simultaneous stimuli, any one of which would alone excite a central impression of colour. It would seem as if a minor amount of stimulation, that can be appreciated only by the rods, must be excited *before* the cones come into functional activity. It is possible that the first action of light on the pigment cell is instrumental in providing a product of secretion or decomposition that is required, so that the finer differences in wave-length can be appreciated by the cones, and the colour sense stimuli be thereby initiated. Very possibly the movement of the cone myoid is of service in this association.

But I must not enter further on the much-vexed question of colour vision, and I leave it gladly, for it seems to me that no explanation has yet been brought forward which adequately accounts for the known facts. Here, as in the consideration of after-images, about which I should have liked to speak had time permitted, it is exceedingly difficult, nay, often impossible, to distinguish phenomena due to retinal conditions from those of psychological origin, and we must wait with reasonable hope for future enlightenment. May the twentieth century see many of our clouds of ignorance dispersed; and may our successors in the Ophthalmological Society, under ever clearer skies, always bear in mind the important part taken in nineteenth century scientific progress by William Bowman, whose splendid example and noble life we commemorate to-night.

REPORTS.

I. DISEASES OF THE EYELIDS.

1. *Fibromata in the eyelids.*

By L. V. Cargill.

S. S—, a married woman æt. 50, has been troubled for the last four months with a heavy feeling about the eyelids, as though she had been crying.

In each lower eyelid, just below the position of the tarsal cartilages, but distinct therefrom, a firm, hard, rounded ridge of thickening is to be felt extending from side to side. That on the right side is rather larger (about 2·5 cm. by 5 mm.) than that on the left side (about 2 cm. by 3 mm.). There is a slight prominence of the skin corresponding to them, which gives the lids a somewhat "puffy" appearance. On everting the lids they roll up and project from the lower *cul-de-sac* beneath the conjunctiva.

There is also a small patch of thickening (about 1 cm. across) at the outer extremity of the left upper lid, just beyond the tarsus, with elevation of the conjunctiva corresponding to it, and very slight prominence of the skin.

A portion was removed from the right lower lid, and it was found to cut like dense fibrous tissue or tarsal cartilage.

Mr. E. E. Henderson, who kindly examined it, reports as follows:

"The growth from the eyelid consists microscopically of much fibrous tissue. With this are numerous connective-tissue corpuscles in various stages of development. Some of these are round, and obviously undergoing multiplication, while others are elongated and of the ordinary connective tissue type. Scattered through the growth are numerous blood-vessels. There are no epithelial elements present. The delicate wavy nature of the fibrous tissue is well seen on staining with any of the well-known connective tissue stains. The growth is a typical fibroma of the growing type, usually called 'fibro-cellular.'"

A portion removed from the left upper lid was found to be of the same nature.

Since the patient was first seen (three months ago) the growths have very slightly increased in size.

Family and personal history good.

Has never had any inflammation affecting the eyelids. Urine normal.

In the 'Traité complet d'Ophtalmologie' of de Wecker and Landolt (vol. i, p. 93) a case of fibroma is reported in the left upper lid of a woman æt. 20. On eversion of the lid it projected from the *cul-de-sac* like a second tarsal cartilage. It had increased slightly in three years. (*Card specimen. January 25th*, 1900.)

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2. *Alveolar carcinoma of the eyelid.*

By Kenneth Scott and John Griffith.

This case before operation presented a most remarkable appearance, as the right eye was entirely masked by a large flat projecting growth in place of the upper eyelid. The patient was an apparently healthy man, except for the presence of the tumour; and his own history, as well as that of his family, was good. He was an Egyptian, æt.

30 years, and a brickmaker by occupation. His right eye, which this tumour obscured, was without vision, and had a central *leucoma adherens*, which dated from infancy. There was a very slight muco-purulent discharge from the eye.

The new growth resembled a clam-shell in shape, and projected 10 mm. horizontally forwards beyond the level of the bridge of the nose, and participated freely in all the palpebral movements. There was no sign of any glandular enlargement, and there was a complete absence of pain. According to the patient's statement, it had only existed for two months, having begun as a small point on the edge of the eyelid, which increased very rapidly in size at first, but later became stationary. Nothing had been attempted towards amelioration excepting removal of part of its free edge by a native barber.

On closer examination the tumour was found to involve only the upper eyelid, where it occupied the whole length of the free border. It was of a bright red colour, with shading of deeper tints; its upper surface was of unbroken skin, which was tense and polished, and closely adherent over the anterior two thirds of the growth; but from this point up to the eyebrow the skin of the lid retained its normal character. The lower surface, which was roughly nodular, was moist and of a pale yellowish-red colour; the remainder of this inner surface of the eyelid, from the posterior edge of the tumour as far up as the conjunctival fornix, was normal in aspect, thus producing an appearance as if the tumour had been merely applied to the originally free palpebral margin. The new growth was of a firm cartilaginous consistence, and was quite painless on pressure. It measured 41 mm. horizontally, and was 15 mm. in its greatest vertical thickness, and stretched out 16 mm. forwards from a point level with the centre of the cornea. (The upper lid of the left eye, which was normal, was 22 mm. in horizontal length between the two canthi, and was of ordinary thickness.) The only break in the continuity of the growth was a dry

scabbed surface, 28 mm. in length, placed on its anterior projecting edge, and was the site of the native barber's interference, as already mentioned.

When the patient came under my care on November 13th, 1898, the tumour showed no signs of active growth, and I removed it eight days later. The operation was scarcely so simple as might have been expected, on account of there being a large vascular plexus leading up to the attached border; I also removed the whole of the substance of the upper eyelid, and only left enough of seemingly uninvolved skin and conjunctiva to form a sufficient cover for protection of the eyeball. The man made an uneventful and rapid recovery, and I saw him for the last time on December 6th, 1898. I regret I was unable to obtain any further information as to the subsequent progress of his case, but this was difficult to do, owing to his markedly nomadic habits.

Mr. John Griffith has kindly made a pathological examination of the tumour, and says :—"The tumour is a typical alveolar carcinoma. It is surrounded by an epithelial lining, partly cutaneous and partly conjunctival. The alveoli vary considerably in shape and size, suggestive of malignancy. Proof, however, is not wanting in this respect, for the stroma is infiltrated with epithelial cells. The stroma is fibro-cellular, and conveys the blood-vessels and lymphatics; the former are not numerous. The cells contained in the alveoli show that diversity of character seen in carcinomata of the breast. Some cells have an appearance that characterises them; these elements are large, spheroidal, possess a reticulated protoplasm and a prominent nucleus. They resemble sebaceous epithelium, and strongly point to the origin of the growth in the Meibomian glands. This view receives stronger support from the presence in some sections of Meibomian glands in which the basement epithelium has given way and the glandular elements are seen to be infiltrating the tarsus. These comparatively healthy glands are surrounded by alveoli of the carcinoma."

Although tumours exactly of this nature are of rare occurrence, one was brought to the notice of this Society by Mr. Simeon Snell in 1896, and is recorded in vol. xvi of the 'Transactions,' p. 39. Research has not enabled me to find any trace of other similar distinct cases, notwithstanding that general reference to their occurrence is made in some text-books and elsewhere.

(*July 6th*, 1900.)

Mr. John Griffith said he would like to thank Mr. Scott for associating his name with the paper. The part he took in it was very small. He would repeat what had been mentioned in the paper—that he considered the case to be primary carcinoma starting in the Meibomian glands in the eyelids. The epithelial cells had the characteristic appearance of sebaceous epithelium; and it was malignant, from the fact that many of these cells were seen loose in the cellular tissue. It was interesting mainly because rodent ulcer was supposed to start as a primary growth in the sebaceous glands of the skin. Structural sebaceous glands of the skin differed immaterially from the Meibomian glands of the eyelid; this growth, however, certainly did not resemble a rodent ulcer, but there was a point of resemblance which he had not mentioned in his description, namely, that in some of the alveoli material similar to sebaceous secretion was present, and that was occasionally encountered in sections of rodent ulcer.

II. DISEASES OF THE CONJUNCTIVA.

1. *Tuberculosis of the palpebral conjunctiva and lacrymal sac, associated with naso-pharyngeal tuberculosis.*

By L. Vernon Cargill.

(With Plate I, fig. 3.)

L. W—, æt. 24, a waitress, came under my care at the Royal Eye Hospital, Southwark, last June. The notes then taken were as follows :

Family history.—Has lost two sisters and two paternal uncles through phthisis.

Present history.—Has enjoyed fairly good general health. Has suffered from lupus of right side of neck and about the angle of the jaw since she was four years old.

History of patient on admission.—Has been bothered with epiphora for some years, particularly on the right side. Eighteen months ago she attended the Central London Ophthalmic Hospital with a swelling in the region of the right lacrymal sac. The lower canaliculus was opened, and the nasal duct was probed some four times. About twelve months ago she had the right upper eyelid operated on (scraped ?), it having become affected subsequently to the opening of the canaliculus she says. Six months ago she had her nose scraped at the Throat Hospital, Great Portland Street. About five months ago her right upper eyelid began to swell and droop, and has gradually got worse.

Present condition.—Dark complexioned and rather sallow. Scar of lupus on right side of neck extending over angle of jaw, and measuring some 3 × 2 inches in extent. Lungs normal.

PLATE I.

Fig. 1 illustrates Mr. R. W. Doyne's case of Essential Shrinking of the Conjunctiva (p. 59).

Fig. 2 illustrates Mr. Simeon Snell's case of Congenital Pedunculated Dermoid of Conjunctiva (p. 193).

Fig. 3 illustrates Mr. L. Vernon Cargill's case of Tuberculosis of the Palpebral Conjunctiva and Lacrymal Sac, associated with Naso-pharyngeal Tuberculosis (p. 48).

Fig. 4 illustrates Mr. L. Vernon Cargill's case of Epitheliomatous Growth of the Right Upper Palpebral Conjunctiva, occurring at the site of incision of a Chalazion (p. 53).

C. Hacking, del.

Fig. 1.

S., del.

Fig. 2.

M. B. Taylor, *del.*

Fig. 3.

E. Davis, del.

Fig. 4.

Bale and Danielsson, Ltd., Chromo-Lith.

Right eye.—Lower canaliculus slit open. Muco-purulent discharge. Almost complete ptosis, and upper eyelid very prominent and appears swollen. On everting there is seen an irregular, projecting, red, fungating mass of granulation-like tissue of "cockscomb" (Arlt) appearance. The surface is uneven, overlaps the base, and presents yellowish and greyish-yellow patches. The mass measures about 2·5 cm. transversely, 1·5 cm. vertically, and rises to an elevation of nearly 1 cm. Between the base and lid margin there are some subconjunctival nodules of varying size. There are also three slightly greyish subconjunctival nodules just inside the margin of the lower eyelid. There is marked pannus, chiefly above, but slightly also below. The right preauricular gland is much enlarged. There is no pain.

Left eye.—Lacrymal sac slightly swollen. No regurgitation or diminution in size on pressure. Conjunctiva normal.

The patient was transferred to King's College Hospital, and Dr. Greville Macdonald kindly examined the naso-pharynx, reporting that there was a tubercular mass on the floor of the *right* nostril, probably just opposite the opening of the nasal duct; a small nodule on the right side of the septum, and one in the pharynx behind the right velum. The left inferior turbinated and the left side of the septum were greatly indurated and infiltrated.

On June 20th, 1899, a small portion of the conjunctival growth was submitted to Prof. Crookshank and Dr. Nash, and they wrote that "it is a beautiful specimen, with crowds of tubercle bacilli," thus confirming the diagnosis which had been made.

On June 22nd, 1899, under a general anæsthetic, the disease (including the nodules on the lower lid) was as thoroughly removed as possible, and regardless of subsequent scarring, by means of knife, scissors, and sharp spoon; the raw surface was rubbed with pure carbolic acid, and powdered iodoform was applied. There was a

deep gap in the upper lid, which has gradually healed, and there is now a fairly extensive scar with a few minute healthy granulations still remaining. The pannus has quite cleared up, leaving the cornea slightly nebulous. The pre-auricular gland has diminished very much in size.

Recently the left lacrymal sac has increased rapidly in size, the swelling being now very prominent, and some 2 cm. in diameter. It is firm and semi-elastic, and the walls feel thickened. The skin over it is rather dusky, but not adherent. There is no pain or tenderness, and no regurgitation or diminution in size on pressure. No enlarged submaxillary glands to be made out on left side. Pre-auricular gland not enlarged.

In the face of the other conditions it would seem most probable that there is tuberculosis of the sac, and, if so, should not excision be performed rather than anything else, in order that the risk of conjunctival or other local infection may be as far as possible avoided? There are still no signs of pulmonary mischief.

The PRESIDENT thought the result of removal of the growth from the right eye had been most satisfactory, and he considered it quite the right thing to do. Personally he thought it would be wise to remove the sac from the left eye.

Mr. DONALD GUNN said he had had under his care a boy who came with a lacrymal abscess on one side. The patient had tubercular disease of the septum and soft palate. He treated the lacrymal abscess by opening the canaliculus, and after some trouble experienced in scraping the tuberculous ulcer, which was present in the skin over the sac, the sac healed and the lacryma trouble practically disappeared. About a year afterwards the patient reappeared with a large tuberculous ulcer in the middle of his upper eyelid. He had no doubt that, in that case at any rate, the sequence of events was that the tuberculous trouble spread from the nose to

ıe sac, and from the sac to the conjunctival structures ;) he would be strongly inclined to advise excision of the ıc rather than opening it, as Mr. Cargill suggested.

(*Card specimen. November 9th*, 1899.)

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2. *Tuberculosis of the conjunctiva.*

By Walter H. Jessop.

Frederick P—, æt. 13, fell down and struck the left ıde of his face against a desk at school on April 25th,)00, and says that on April 26th the left eye was blood-ıot.

On April 28th the pre-auricular gland was painful and ıflamed. He came to St. Bartholomew's Hospital the ıeek after accident, and the house surgeon ordered hot)mentations for the gland. One month after injury the ıland was incised and a little caseous matter evacuated. ı week after this he was sent to the Ophthalmic Depart-ıent.

He then had an ulcer with hardened indurated edges ı outer side of the inferior eyelid of left eye, and I ıought it might be a primary sore, and treated it with a)tion of perchloride of mercury, and ordered mercury ıternally.

The ulcer improved a little, but as it had altered in ppearance and manifested less induration, a guinea-pig as inoculated on June 8th.

On June 20th the patient was admitted into the hospital.

Left eye.—In lower sulcus of conjunctiva on outer side an ulcerated surface with thickened nodular edges athed with purulent secretion. The surface is granular, nd in parts the edges are finely lobulated. The ase of ulcer is deeply excavated, and the nodulated ppearance extends from in front of accessory lacrymal

gland in an upward direction for about 1·5 cm. at abou 1 cm. from the corneal margin, and also for some dis tance below on the bulbar conjunctiva.

On the palpebral conjunctiva of the lower lid are severa small sago-grain-like granulations.

The conjunctival and subconjunctival vessels are con gested on the outer side, and at middle of "limbus" o outer side is a small raised tubercle.

Left pre-auricular gland.—Incision still unhealed and granulating. He has had no pain in eye. Dr. Andrewes reports that fourteen days after inoculation the guinea-pig developed an enlarged gland in groin; twenty-four days after a local abscess was found at seat of inocula tion, which discharged pus crowded with tubercle bacilli and on July 5th the glands in groin are progressively enlarging.

Previous history.—Has had measles; fractured four years ago clavicle, and five years ago tibia.

Family history.—No history of tubercle; parents alive and well.

No other signs of disease except some moderately enlarged glands in neck and left axilla. Temperature normal.

Vision, R. $\frac{6}{6}$, L. $\frac{6}{6}$ partly. Ophthalmoscope—fundus etc., normal.

(*Card specimen. July 6th*, 1900.)

The PRESIDENT said as the condition penetrated so deeply he would be inclined to use the galvano-cautery as scraping would be insufficient. He could not narrate any cases bearing on it.

Mr. HOLMES SPICER said he had had four or five cases of tuberculosis of the conjunctiva at the Children's Hospital and at Moorfields. In some of them the condition was verified microscopically, in others not; but the condition was so characteristic that he thought there could be no doubt about any of them. One feature which he

oticed in all of them, and in Mr. Jessop's case also, was uppuration in the pre-auricular gland. He treated all of he cases from the beginning by complete removal of the lcer to its base, and the treatment was successful. He egarded it as a condition eminently curable if the case as taken in good time. The treatment he adopted was ery vigorous scraping, which might have to be repeated wo or three times; but the present case showed very eep ulceration, so that he would agree with the President hat the galvano-cautery should be applied.

. *Epitheliomatous growth of the right upper palpebral conjunctiva, occurring at the site of incision of a chalazion.*

By L. Vernon Cargill.

(With Plate I, fig. 4.)

E. H—, a healthy woman æt. 58, came to the Royal Eye Hospital, Southwark, a few days ago, with a drooping f the right upper eyelid.

Family history excellent; no history of tumours.

About five or six years ago she noticed a lump forming in the right upper lid, which grew very slowly to the ize of a pea. She had it opened at the Royal Eye Hospital about two years ago, and on her old out-patient paper there is the diagnosis of "Chalazion." She had o further trouble until three months ago, when the ight eye became irritable, and has remained so since. The upper lid began to droop about a year ago, but she lid not know that there was anything growing under it.

On everting the right upper lid there is seen an opaque, white, cauliflower-like, or warty growth, occupying nearly he whole of the median half of the tarsal conjunctiva. t measures some 15 mm. vertically by 10 mm. transversely; it is thickest and most sprouting at its upper part, where it overhangs its base, and is seen, with a lens, to

consist of papillæ with fine blood-vessels between them. Towards the edge of the lid it becomes flatter and quite sessile, and on the outer side it is quite flush with the conjunctiva beyond, but still presents its opaque white colour. The growth does not affect the margin of the lid or invade the retro-tarsal fold. The surrounding conjunctiva is deeply injected. The eyeball is normal. No enlargement of pre-auricular or submaxillary glands is to be detected.

A small nodule of the growth, together with some subjacent tissue and apparently healthy conjunctiva, was submitted for microscopical examination to Mr. E. E. Henderson, the Pathologist at the Royal Eye Hospital, and he reports as follows :—"The growth itself consists entirely of large epithelial cells. On the free surface they are slightly flattened. In part of the nodule the epithelial cells are separated from the conjunctiva by a membrane of fibrous tissue. In places this is deficient, and the epithelial cells are to be seen making their way into the small-celled infiltration which invests the deep surface of the growth. Some epithelial cell-nests may be observed. These characters render the probability of the growth being epitheliomatous very great."

(*Card specimen. December 14th,* 1899.)

Mr. John Griffith said the sections looked like those of epithelioma. There was a small-celled infiltration around, which was not usually present in an ordinary papillomatous growth. He thought it was malignant.

4. *Specimen of epithelioma of upper palpebral conjunctiva from Mr. Cargill's case, shown December 14th,* 1899.

By E. Erskine Henderson.

The piece of growth removed from the upper right palpebral conjunctiva measured about 20 mm. long, 10

mm. high, and 3 mm. thick. For convenience in cutting it was divided into four pieces, as nearly as possible vertically.

Section No. 1 reaches to the top of the Meibomian glands, and just cuts the orbicularis muscle. Throughout the whole length of this section the epithelium is thickened, and there are no papillæ visible. At the upper part the epithelium is about 7 mm. thick, but increases at the lower quarter to a little over 1 mm. At this lower part the epithelium is not quite so well marked off from the subjacent tissue, and is surrounded by numerous small round cells. The epithelial cells are of various sizes, the largest being about ·007 mm. in diameter. Some cell-nests are to be made out, and in the nuclei are some indications of rapid multiplication. A few fibrous septa run between the epithelial cells at the upper part of the section, but disappear lower down.

In No. 2 the appearances are very similar. There is, however, a much more marked difference between the upper and lower part of the section. The upper part, although a little thickened, is otherwise normal, whilst the lower is much thickened, also a little vascular, and shows some degenerated patches.

In No. 3 the epithelial growth is at its maximum, and is here nearly 3 mm. thick. The section otherwise presents the same features as No. 2.

In No. 4 the edge of the tumour is reached, and it is similar to No. 1.

Nos. 2 and 3 are the most typical, and are through the centre of the growth.

There can be no doubt that the growth is of the nature of an epithelioma.

(*Card specimen. January 25th*, 1900.)

5. *Case of sarcoma of the upper conjunctival cul-de-sac.*

By John Griffith.

The notes of this case were read by me before the Portsmouth meeting of the British Medical Association last August, so I do not now intend to repeat the full description of this unusual case. As it is undoubtedly a rare lesion, and has recurred, I have brought the patient here with a view of obtaining information as to the best treatment of the recurrent disease.

The patient, aged 45, informed me that the tumour was first noticed last Christmas by Dr. Haddock, who recommended her to see Mr. Juler, at St. Mary's Hospital. Mr. Juler saw the case towards the end of March, and, as he was leaving town for a few days, he kindly transferred the case to me, and advised the excision of the growth and upper fornix, the diagnosis of sarcoma having been previously made by microscopic examination.

The condition at that time was as follows :—A slight swelling of the upper eyelid, more evident when she looked down. There was no pain nor discomfort. The eyeball itself was discoloured and had been for some time, at least eighteen months prior to the discovery of the tumour. The growth, which occupied the greater part of the upper *cul-de-sac*, was lobulated, and projected downwards when the lid was everted. Some of its nodules were pigmented. There was no manifest displacement of the eyeball, no interference with its movements, no diplopia, nor any indication that the growth had its origin in the orbit. Beyond the pigmentation of the ocular conjunctiva the eyeball itself was normal.

The growth was freely excised, and with it the upper half of the tarsus and the whole *cul-de-sac*. It was necessary to divide the eyelid vertically near the inner canthus to facilitate the operation.

The wound healed quickly and left behind scarcely any

ptosis. A recurrence was first noticed on November 8th, when a definite thickening could be felt and some new growth (?) seen on everting the lid. A section of the tumour has been placed under the microscope. It is a mixed-celled sarcoma, having its origin, in all probability, in the conjunctival fornix.

(*Card specimen. December 14th*, 1899.)

The Chairman (Mr. A. Q. Silcock) said it seemed to him the diffuse subconjunctival pigmentation in that case was unusual. Whether that was indicative of the spread of the growth along the subconjunctival lymphatics or not, he did not know. There was no similar pigmentation in the other eye.

Mr. Marshall said he had seen another case of conjunctival pigmentation. Mr. Lawford had had under his care a patient in whom, for a considerable time, there was no sign but pigmentation of the conjunctiva. The case was shown before the Society. Subsequently the contents of the orbit were excised for sarcoma, which developed later. He (Mr. Marshall) looked upon the pigmentation as indicative of malignant disease, and he strongly recommended complete removal. In the present case he regarded the patient's life as of more importance than disfigurement, and would therefore advise the larger operation.

Mr. Griffith, in reply, said he had not regarded the pigmentation of the ocular conjunctiva as connected with the growth. It was recognised eighteen months before the tumour. The case was seen by Mr. McHardy, at King's College Hospital, when there was nothing but pigmentation.

P.S.—On February 20th the recurrent growth was removed, together with the eyelids. The eyeball was excised, and the whole orbit, including periosteum, exenterated. The lacrymal sac was opened up and its muco-periosteal lining dissected away. The healing process was slow, but the cavity granulated up from the bottom without any

complications. No bone exfoliated. The resulting deformity is not a great disfigurement, and when Mrs. T— was last seen (July 10th) there was no recurrence of the sarcoma.

6. *Case of membranous conjunctivitis.*

By A. Q. Silcock and G. D. Maynard.

William D—, æt. 2, was admitted on August 18th to the Royal London Ophthalmic Hospital.

On admission.—The palpebral conjunctiva of left eye was covered with a thick grey membrane, which peeled off easily, leaving a rough slightly bleeding surface. Cornea hazy. Other eye not affected.

History.—Eye first became bad on August 14th, on following day a white membrane was seen and a doctor called in. He treated it with drops (?) and a lotion made from "poppy heads."

Cover-glass preparations were made from discharge, and a bacillus resembling diphtheria was seen. No history of diphtheria having occurred in the house. Patient was treated at the hospital, with Lot. Quininæ Sulphatis gr. iv to ℥j as a douche, and Ung. Atrop. gr. ij to ℥j till August 22nd.

On August 21st the child's mother developed pharyngeal diphtheria and was sent to Fulham Fever Hospital. She had been quite well up to August 19th.

On the 22nd the child was sent to Fulham, and was treated there for ten weeks.

October 23rd.—Child returned to R. L. O. Hospital. Membrane still present in eye. Cornea sloughed.

31st.—Child admitted and eye excised.

December 2nd.—Has been treated regularly ever since October with Lotio Acid. Boracis and Ung. Acid. Boracis, but membrane still persists.

(*Card specimen. December 14th.*)

Mr. Marshall asked what were Mr. Silcock's opinions concerning the bacillus which was present. He had examined the membrane from this patient over and over again, and found bacilli which he could not distinguish from those of diphtheria. He believed it was an attenuated form, and was only recognised by some very minute characteristics of its growth. His point was, whether this patient was likely to transmit the disease to a healthy person.

He further said he had, on more than one occasion, injected broth cultures of micro-organisms from certain cases of membranous ophthalmia into guinea-pigs, but with very little result. Therefore he felt it would be of importance to determine, in this particular case, whether the organisms would produce toxic symptoms. In his own cases he had never seen the bacillus in such unmistakable form as in this case. Perhaps experiment would throw some light on the character of the organism present.

Mr. A. Q. Silcock, in reply, said that Mr. Plimmer stated that if a culture were injected into a rabbit, the animal would die within a few days, and its serous membranes would be found inflamed post mortem. He did not know whether the membrane would produce true diphtheria in another person.

P.S. July 13th, 1900.—The membrane disappeared, soon after the case was read before the Society, under treatment with perchloride of mercury lotion.

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7. *Case of essential shrinking of the conjunctiva.*

By R. W. Doyne.

(With Plate I, fig. 1.)

Levi W—, æt. 60. Thirty-four years ago he says he had "scurvy of the gums" and much bleeding from

them. At the same time the eyes became affected and the eyeballs grew to the lids. Both eyes got worse for three years, and the left was quite dark, but he still could read with the right.

Both eyes were then operated on and the edges of the lids removed with the lashes. He could read after this for eighteen months, when the sight became gradually reduced to perception of light. All his teeth have come out, the last about four years ago. He attended the Oxford Eye Hospital because of the lumps at the inner canthus of the right eye. These have been forming, and disappearing on pressure for the last twelve months, the discharge going down the nose.

Present condition.—There is no trace remaining of any conjunctival sac, the skin of the orbit passing straight on to the cornea, the surface of which is dry and opaque. He has fairly accurate projection of light in the right eye in front and to the outer side. There is no perception of light in the left eye. He has some old scarring in the throat.

(*Card specimen. January 25th*, 1900.)

Mr. Kenneth Scott said he had met with one case similar to Mr. Doyne's, and that was in an Egyptian, the wife of a pasha. She lived well, and he did not ascertain that there were any peculiar conditions of surroundings.

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8. *Pemphigus conjunctivæ.*

By Henry Juler.

Mrs. B— was first seen by me last Monday, January 22nd, when her condition was as follows:

Right eye.—Vision = $\frac{6}{18}$ and J. 1. Photophobia and lacrymation. The cornea is clear. There is a tendency

Fig. 1.

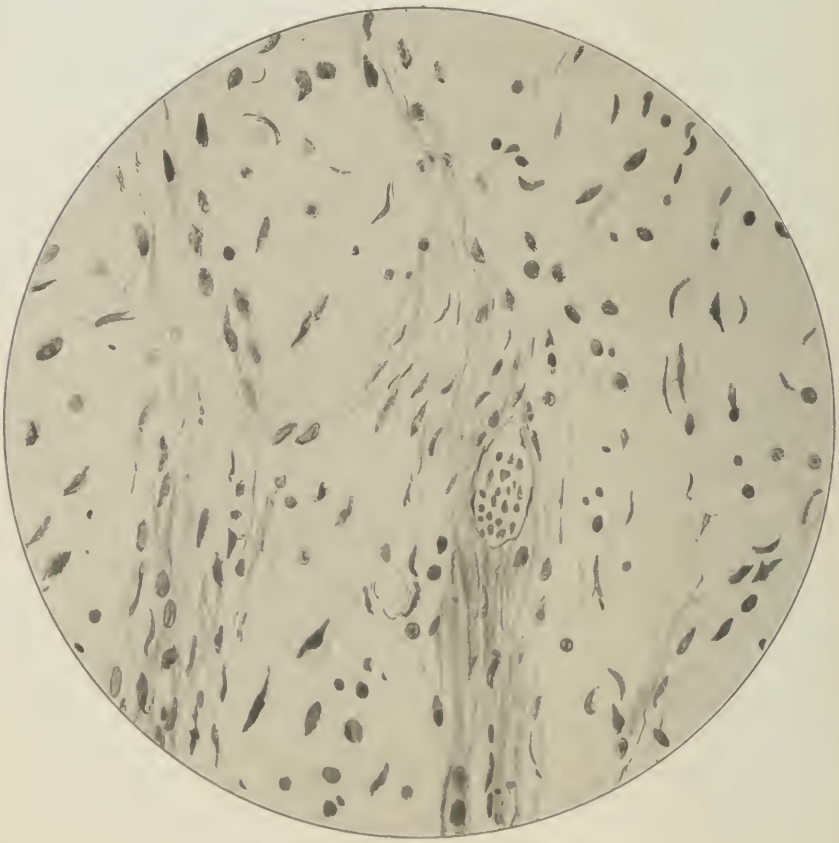

Fig. 2.

PLATE II.

Illustrates Mr. W. T. Holmes Spicer's Section of Conjunctival Growth in Spring Catarrh (p. 63).

Fig. 1.—Zeiss A.

a. Pedicle.

b. Epithelial covering.

c. Bulk of growth made up of connective tissue with blood-vessels.

Fig. 2.—Zeiss D.

Showing a portion of the mass of the growth consisting of delicate strands of connective-tissue fibres running in various directions, with blood-vessels cut across in places.

for the lashes to turn in. A bulla is present in the palpebral conjunctiva of each lid, and various scars, as if from previous bullæ, are to be seen. General shrinking of the conjunctiva is not pronounced. This eye first gave her trouble four or five weeks ago.

Left eye.—Vision = $\frac{6}{60}$ and J. 1. Symptoms more marked. The cornea is clear. The lids are thickened, and the lashes tend to turn in, as if from incipient conjunctival contraction. Numerous bullæ are present in the palpebral conjunctiva; the scar tissue is more extensive. The disease attacked this eye four or five months ago.

The mouth.—The inside of the lips and the hard and soft palates show ulcerations; scar tissue and one or two recent small bullæ are seen.

The skin has always been free from vesicles and bullæ.

Family history.—There is no evidence of specific disease. She has had five children (no miscarriages), and is the eldest of a large family; two of her brothers have died from "consumption."

(*Card specimen. January 25th,* 1900.)

Dr. Gruber said he had seen one case of essential shrinking of the conjunctiva in pemphigus. The result was always exceedingly bad, and he thought it almost impossible to do anything very permanent for the disease.

Mr. J. R. Lunn mentioned a case which was before the Pemphigus Committee. It was that of a boy 12 years old with congenital pemphigus, *i. e.* which had existed ever since the child was three days old. Mr. Stephenson had seen and examined the case with him, and saw remains of the pemphigus left on the cornea. Since he reported that case and sent his notes to the Committee the boy had had a third attack of vesicles on the cornea. He always got well under treatment. His tongue was bound down in his mouth, and he had got bullæ over his body. He had been shown to several Societies, and Mr. Lunn proposed to bring him before the present Society if he

were allowed. He had another man under his care at the present time, about 50 years of age, who had an acute attack of herpes frontalis, which was followed by a bulla on the cornea in a few days.

Mr. Nettleship said that some years ago he was consulted about a boy in whose case there was a history that pemphigus had occurred all over the body and on certain mucous membranes, including the mucous membranes of the eyes. The unusual feature in the case was that the whole condition got well, and the skin and gastro-intestinal attacks subsided, as well as the condition of the conjunctiva, the latter remaining much scarred. He saw the boy again some years later, and found the eyelids *in statu quo*.

Mr. Juler confessed his disappointment at the result of the discussion. One of the speakers had said the affection could only be arrested. He (Mr. Juler) would be glad to know how to arrest it. The woman had very good vision in each eye, and if he only could arrest the disease he would be happy. He thought general skin pemphigus could exist without very much eye trouble, but the anxious cases for them were those in which the mouth, throat, and eyes were involved with a vengeance, with a large amount of lacrymation, injection, and infiltration of the conjunctiva, which he feared might mean total blindness. He felt sure that Mr. Lunn's case of herpes frontalis was not pemphigus at all, but a peripheral neuritis.

Additional note (June 20th, 1900).—Since January last Mrs. B— has been constantly under observation, and on the whole has got gradually worse, in spite of treatment. Her cul-de-sacs have been cauterised with the electro-cautery, and also several small vesicles which have from time to time appeared on the conjunctiva. The inner surface of the lids has been scarified, and Lotio Hydrargyri Perchloridi, 1 in 500, has been rubbed in. The lids have been repeatedly brushed with nitrate of silver. The

cul-de-sacs appear to be gradually becoming cicatrised up; indeed, both lower lids have had to be operated upon for entropion.

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9. *Case of spring catarrh; section of conjunctiva from case of spring catarrh.*

By W. T. Holmes Spicer.

(With Plate II.)

John K—, æt. 7, came to Moorfields on October 4th, 1899. He was the son of a soldier, and spent his early years in India; he came to this country three years ago. No definite history could be obtained, but he had been subject to attacks of redness of the eyes for more than a year. He had measles in March, 1899, and the eyes have been continuously bad since.

When first seen there was a central nebula in the right cornea, and a good deal of thickening of the limbus at the upper and lower margins of the cornea. These parts were of a dusky red colour. The appearance was that of confluent phlyctenulæ.

On everting the lids, the right upper fornix was seen to be crowded with small pedunculated growths having comparatively thin stalks; where the warts were small, the appearance resembled the pile of plush. About the centre of the lid were some growths of much larger size, consisting of a pedicle and a bulbous end. Where the "granulations" were flattened by pressure against the cornea they had the usual paving-stone character. The conjunctiva had not the white bloom on the surface so often seen in spring catarrh.

In the left eye there were the plush-like granulations at the upper fornix only. The limbus was unaffected, and the bloom on the surface of the conjunctiva was not present.

On October 7th the strip of conjunctiva at the fornix containing the largest of the granulations was removed; it was tough, and the bases of the warts were of almost gristly hardness; other smaller ones were cauterised.

Postscript.—The immediate result was some improvement. The granulations were less marked on everting the lid for some weeks, but afterwards others as large as the original ones had sprung up, and his condition now is about the same as it was nine months ago. The granulations were hardened in formol, cut and stained with logwood and carmine.

The section shows an outermost layer of conjunctival epithelium consisting of about five rows of cells where cut quite at right angles to the surface. At the sides of the section where it is cut obliquely, more layers of cells are seen. In places the epithelium dips into the substance of the tissue beneath as finger-like projections, and in some places these fingers can be seen cut across, giving the appearance of nests of cells. Taking the sections all through, however, the epithelial covering bears a very small relation to the mass of the growth.

The pedicles of the growth consist of strong bands of connective tissue and blood-vessels. These divide and subdivide as they pass away to the more distant parts, but it is of this fibrous tissue formation that the great bulk of the growths consist.

It would seem more correct to call these growths fibromata from their structure than papillomata even, the amount of epithelium entering into their formation being not greater than that forming the normal conjunctiva of the lid.

The sections shown here seem to be identical in appearance with those drawn by Hans Schlub in the 'Archiv f. Augenheilk.,' vol. xxxv, taken from the corneal limbus in a case of spring catarrh.

(*Card specimen. June 7th*, 1900.)

III. DISEASES OF THE CORNEA.

1. *Recurring superficial necrosis of the cornea.*

By R. W. Doyne.

With this somewhat formidable name I do not mean to introduce you to a new eye disease, but rather to a very old one, instances of which are common enough ; but it has not seemed to me to have been sufficiently differentiated from others of a like nature that are very much more common, I mean recurrent corneal ulceration.

The class of case to which I wish to draw attention occurs in patients who as children or young adults have suffered from corneal ulceration, which used to be described as " strumous " or " scrofulous," and who mostly have had a phthisical family history. The ulceration has never been very deep, and though there is, of course, a nebulous condition of the cornea more or less intense, yet it is never of a deep leucomatous nature, and so slight is it in some cases that at a casual glance nothing might be noticed. Many of these patients succumb to other troubles when young, but those who survive and become comparatively robust are liable on sufficient provocation to sudden necrosis of the epithelium, and probably of the superficial part of the cornea. The point I wish to emphasise is, that it is not ulceration that gradually spreads over the previously affected area, but that the epithelium of the whole area is shed at once. In lowered states of health any slight cause may be sufficient to do the mischief, but even in good health sufficient provoca-

tion may arise,—in, for instance, exposure to a very biting cold east wind.

The condition thus suddenly established slowly undergoes the reparative process, vessels run on from the margins of the cornea, and in the course of months, or it may be a year or two, the vessels shrink, the healing is complete, and the patient is ready for another attack. From start to finish the healing process seems to go on very slowly and steadily, but without the relapses so common in recurrent corneal ulceration ; indeed, so long as the healing process is going on I regard the patient as safe from further mischief, the danger only again appearing when the vessels dwindle with recovery. There is no especial difficulty about treatment. I believe the most successful treatment would be that which delayed the healing process. The problem to be solved is how to prevent recurrences. I have of late advised such patients to use eserine drops about twice a week, in the hope that the congestion of the anterior pole of the eye that is produced by its action may bring additional blood-supply to the lowly organised parts, but I cannot confidently say whether these drops are of real value or not.

I will give one typical instance of this disease.

H. M. G—, æt. 48, who lost two sisters from phthisis and whose lungs were affected seriously, had what was called "strumous ulceration" of the right cornea when young. He went abroad to the Rocky Mountains, recovered his health, returned home, and now is a fairly strong man, but is subject to these recurrent attacks I have described.

The first time I attended him was about eight years ago, when, not being in a very robust state of health, he attended the funeral of an old friend on a cold day in early spring. He felt his eye bad immediately afterwards and came to me, when I found that the epithelium over the whole slightly nebulous area had perished. He slowly recovered in about eighteen months.

Three years ago he was deerstalking in Scotland in a biting wind. He felt his eye painful, and came straight away to me, but in the same way as before the whole epithelium over the affected area was shed. He is still slowly recovering from that attack, and I dread for him the moment of complete recovery. I shall be glad of any hint as to what should be done to prevent another recurrence. (*October 19th*, 1899.)

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2. *Interstitial keratitis in acquired syphilis.*

By J. B. Lawford.

The cases, five in number, of which notes are submitted, are instances of interstitial non-ulcerative keratitis in the subjects of acquired syphilis.

In Cases 1, 2, and 3 the evidence as to syphilis is indubitable, and it is reasonable to assume a causal relation between the constitutional condition and the disease of the cornea.

Cases 4 and 5 are, I think, open to question; I include them as possible examples of syphilitic keratitis in adults, in whom no other cause for the ocular lesion could be discovered.

In the 'Transactions' of this Society, vols. xi and xii, there are notes of a case of interstitial keratitis in acquired syphilis reported by Mr. Lang. In this case the primary lesion was conjunctival.

In all the cases under my observation, as in nearly all the published records to which I have referred, the disease has been limited to one eye.

Case 1.—Mr. X—, a medical man, whom I saw in

November, 1891, had a primary syphilitic lesion of th right lower eyelid on the conjunctival surface. It characters were such as to leave no doubt of its nature the source of infection was a patient with syphiliti disease of the nasal bones, upon whom Mr. X— ha operated.

The palpebral lesion had appeared fourteen day before I saw him.

Improvement under mercurial treatment rapidly ensued and the local signs all disappeared in due time.

Four and a half months later I again saw Mr. X— He had had sore throat for about one month, but no ras or loss of hair. He had been very hard worked, and ha lost weight rather rapidly. In the right eye there was well-marked patch of deep haze and vascularity in th upper part of the cornea, in all its features exactly lik the keratitis of inherited syphilis. A few days later th vascular area had extended further into the cornea; th eye was more injected, and there was some discoloratio of the iris. The left eye was in all respects healthy. have not seen Mr. X— again, but he wrote to me i August, 1899, that "the right cornea got quite well there may be the faintest possible haze, but it is hardl noticeable." Treatment by inunction of mercury ha been carried out for more than eighteen months, an there had been no recurrence of any kind.

Case 2.—Mr. Y—, æt. 26, consulted me on Decembe 6th, 1898. In the first week of November, 1897, he ha a hard chancre on the penis. He was put on mercuria treatment at once, and has continued to take mercur almost all the time since. In December, 1897, he ha an inflammatory affection of his right eye, which he say was called "iritis." The attack was slight, and recover soon ensued. About Christmas-time, 1897, he had a ski eruption, which lasted till February, 1898. Soon afte this he had a bad throat, treated by local applications o mercury.

No further symptoms occurred till about the 22nd of October, 1898, when his right eye became weak and uncomfortable. He consulted a medical man in the country town in which he lived; a few days later he came to London.

When I saw him the condition was as follows:

Right eye: ciliary injection, photophobia, but no pain. A large patch of deep haze in lower part of cornea, extending as far as centre. It is very vascular in the greater part of its extent. No ulceration. Pupil partially dilated by atropine, and circular. No synechiæ. Tension normal. The episcleral congestion was most marked in the lower part, where the conjunctiva and sclera had a peculiar yellowish tinge; no extravasation of blood was visible. The left eye was unaffected.

He was taking a mixture containing iodide of mercury. This I continued, and gave him atropine locally.

Improvement soon began to be noticeable, the hazy area becoming less vascular, and subsequently the grey infiltration breaking up into smaller areas with semi-transparent interspaces. During the next few weeks several mucous patches developed on the tongue.

By the end of January, 1899, the haze of cornea was decidedly less dense; the ciliary redness had almost entirely disappeared, but the eye flushed on exposure. On examination with a magnifying lens, the hazy part of the cornea contained very numerous closely set vessels extending upwards in almost straight parallel lines. Except at the extreme margin of the cornea no blood-stream was visible in them.

I saw Mr. Y— last on February 6th, 1899, when the eye was making good progress towards recovery, the haze of cornea diminishing steadily; residual vessels were very numerous. He was still taking iodide of mercury regularly, and using atropine drops three times a week.

P.S.—In a letter dated October 28th, 1899, Mr. Y— says, "My right eye has made wonderful strides, but it is not yet as clear as the left one; there is still a slight

mist, but I can read well with it. I have had some ulcers on the tongue, but since June last have been free from any symptoms."

Case 3.—Mrs. H— æt. 39, attended Moorfields Hospital on December 29th, 1897. Her right eye was affected by a diffuse interstitial keratitis; in the upper part the cornea was vascular and grey, and at the extreme upper edge was a very distinct salmon patch. The pupil was active, and dilated circularly to atropine.

In the left eye nothing abnormal was found.

There was no history of any previous eye affection.

The history as to syphilis was unusually definite. Thirteen years before she had prolonged affection of the throat, skin eruption, and loss of hair. She attended St. Bartholomew's Hospital for nearly two years; her finger-nails were "very bad," and her voice was husky.

Twelve months ago perforation of the hard palate occurred.

She brought to the hospital with her a daughter, Violet H—, æt. 8, suffering from typical interstitial keratitis in both eyes.

Her first child is living, æt. 18; five subsequent pregnancies resulted in stillbirths; then the daughter Violet, and there are three younger children.

This patient was under observation for four months, and was treated by iodide of potash internally, and atropine locally. The corneal haze and vascularity diminished, and when last seen the eye was free from injection, and the opacity of the cornea was very slight and limited to the upper part.

I am indebted to my colleague, Mr. Herbert Fisher, for the notes of this case.

Case 4.—Mr. Z—, æt. 32, came under my care on February 23rd, 1892. He had noticed some dimness of vision of his right eye for about one month.

The right cornea in nearly the whole of the lower half

had a grey striated haze, looking rather superficial; there was, on careful examination, slight roughness of the epithelium, but no ulceration. A little ciliary injection; pupil circular and active. T. n. V. = $\frac{6}{8}$ partly.

Left eye unaffected.

There was no history of previous eye affection. Patient was the seventh of ten children, all healthy. He had none of the ordinary evidences of inherited syphilis. No history of injury. Ten years before he had gonorrhœa and a soft chancre. Seventeen months before I saw him he had a chancre, which was followed by a suppurating bubo. Soon after this he had a skin eruption and loss of hair. He gave a very indefinite account of the skin eruption, but was precise as to the loss of hair. He had had no subsequent manifestations. At the time of the chancre he was abroad, and had very little treatment. About six weeks before the eye became affected he had a slight febrile attack (he had had malaria in Central America). His urine was normal.

This patient was under observation for five months; the corneal condition at first became worse, but subsequently began to improve, and when I last saw him, in July, 1892, the haze had almost wholly disappeared, and vision was $\frac{6}{6}$. He was treated by iodide of mercury internally, atropine, and later yellow oxide of mercury locally. At no time was there any ulceration of the cornea. No iritis developed, and no choroidal disease was found.

Case 5.—James W—, æt. 38, was under my care at Moorfields Hospital in October, 1898.

He attended on October 12th, because his right eye had been bloodshot for four days. It showed slight ciliary redness and photophobia. At the upper margin of the cornea there was a tongue-shaped area of grey infiltration, without ulceration, into which new vessels passed from the limbus.

The left eye was unaffected.

Nineteen or twenty years before he had a chancre

followed by spots on his chest. He was under medical treatment for five or six weeks.

He is married, and has two children, æt. 7 and 8 years. His wife has had no miscarriages.

There is no evidence of inherited syphilis in the patient.

This man was under observation for two months. The infiltration and vascularity of the cornea increased considerably in area and density, but no ulceration occurred. Improvement subsequently began, and was making steady progress when the man was last seen. He was treated by iodide of potash internally and atropine locally. (*October* 19*th*, 1899.)

The President, in thanking Mr. Lawford for his paper, said that most of the members must have met with a certain number of such cases, and he thought, for the sake of the 'Transactions,' they ought to have been put on record. He was glad to hear that a distinct salmon patch was met with in one case. He had never been able to persuade himself that there was a true salmon patch in his cases, though there was generally vascularity, and in the patients he had seen the opacity of the cornea had not been, as a rule, so deep, so interstitial, as in the inherited cases.

Mr. John Griffith asked whether Mr. Lawford regarded the interstitial keratitis as a secondary or a tertiary manifestation of acquired syphilis. In the case recorded by Mr. Hutchinson it occurred as a secondary manifestation. He, Mr. Griffith, had seen four cases of interstitial keratitis which were attributed to acquired syphilis, and they were all three or more years after the initial lesion. One case which came under his care was extremely interesting, and he gave a hopeful prognosis. After a year or so, however, it did not clear up, and eventually the eye was lost, vision being now only perception of light. Mr. Lawford had given rather a hopeful prognosis. Another feature was that the patient's

nails were affected, as in one of Mr. Lawford's cases, the appearance being as if worm-eaten. Both tissues—the nails and the cornea—were chemically allied.

Mr. W. Lang said he had recorded one such case in the 'Transactions,' vol. xii. The man had a chancre of the ocular conjunctiva, and, from its close proximity to the cornea, he anticipated that the eye would be attacked by interstitial keratitis. In course of the year the cornea inflamed, and though it was eight years since the case was recorded, the other eye was not yet affected. As far as he remembered there was slight vascularity of the cornea; ultimately the keratitis cleared up and left a good eye.

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3. *A case of cicatrix horn growing from the cornea.*

By Arnold Lawson.

In bringing this curious case under your notice this evening, I had hoped to have been able to produce one or two other published examples of a similar condition, and to have compared their histories and pathology with my own case. I am sorry to say, however, that I cannot do this, because a careful search through ophthalmological literature has failed to bring to light a single other case of a horny growth arising in connection with the globe. With all the immense amount of literature published it is most difficult to be accurate on this point, and most easy to miss a stray case or two; I can only say that I have failed to discover another example, and shall be very glad to hear that I am mistaken, so that I may be able to compare any such cases with the one I am about to relate. I think that some other cases must have been seen, if not published, from an observation of Dr. Nuel in Drs. Norris and Oliver's recent work, which is the

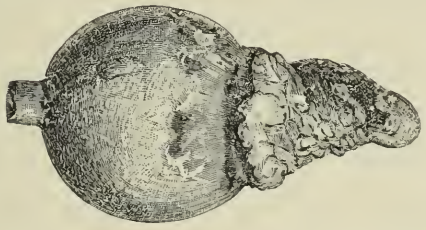
only remark upon the subject that I have come across, and in which he states that "the corneal epithelium covering cicatrices may undergo hypertrophy, and become cornified." To this I shall refer again later. I will now give you a brief history of the case, and then discuss its ætiology and pathology.

History.—The patient, a female child æt. 8 years, and a hydrocephalic idiot, was admitted under the care of Dr. G. A. Sutherland into the Paddington Green Children's Hospital on November 8th, 1898. As the case proved unamenable to medical or surgical treatment Dr. Sutherland handed it over to me, on account of the condition of the eyes. The child was extremely wasted and badly developed, the body and limbs being those of an infant of one year old; she was unable to raise herself or feed herself, took no notice of anything unless touched, when she screamed violently, and evinced no sense of hunger or thirst, though she would eat or drink voraciously when food was given her. Her power of speech was centred in an oft-repeated inquiry as to the health of daddy and the children, which she murmured to herself at frequent intervals during the day.

The condition of the eyes was as follows:—Both eyes were somewhat proptosed, and quite blind. The right cornea was covered over its central four-fifths by a rough tuberculated excrescence, conical in shape, with its base resting on the cornea, and its apex projecting between the lids for the distance of half an inch. The history given was that a white spot had appeared on the eye twelve months previously, and that the excrescence was first noticed six months later, and that it had gradually increased in size since that time. In the other eye there was a yellowish-white infiltration of the cornea near the pupil, and the cornea was becoming staphylomatous at this spot. The anterior chamber was deep, and the tension rather higher than normal. In the right eye the tension was normal, and the visible part of the cornea quite opaque. Sensation was much diminished in both

corneæ, and there was a considerable muco-purulent discharge, with chronic inflammation of both conjunctival sacs. A few days after the case came under my care an accidental knock detached the horny growth from the right eye, leaving a soft, white, fleshy core attached to the centre of the cornea, which was staphylomatous, and everywhere quite opaque. A few days later I excised the eye, as it was extremely unsightly and quite useless. Examination of the eye after removal showed the retina to be coarctate, and that there had been a chronic inflammation of all the structures of the eye. The anterior chamber was completely abolished, and the iris everywhere closely adherent to the cornea. The cornea itself had evidently perforated centrally, and the opening had been closed by the fleshy cicatrix, which formed the core of the horny growth.

Fig. 10.



The horn itself was soft and crumbling in its centre, but the external layers were hard and horny, and cut like cartilage. It was five-eighths of an inch in length, and measured about one and a half inches round its base. Microscopical sections were made through its thickness, and stained with carmine. The growth was then seen to consist of two distinct parts, an external homogeneous layer occupying about one fourth of the section, and an inner layer composed of small, round, nucleated cells. The external layer stained badly, and consisted of a fibrillated material somewhat resembling the matrix of cartilage.

Ætiology and pathology.—The case is interesting, not only as a curiosity, but chiefly from a pathological aspect.

Its origin and formation may be explained by the consideration of the following sequence of events. Firstly, we may conclude that chronic atrophic changes were induced in the eye from pressure upon the ophthalmic division of the fifth nerve, set up by the hydrocephalic condition. Amongst other changes the cornea began to yield, and after a time a central ulcer appeared, which finally perforated. The result of such a perforation must either be a fistula of the cornea, followed by gradual shrinking of the globe, or a cure by the formation of cicatricial tissue. The latter happened in this case, and abundant granulation tissue closed the perforation. The scar tissue instead of being limited to the requirements of the case and forming a firm cicatrix, as happens in healthy wounds, continued to grow, and became exuberant, simulating exactly the condition which is frequently met with in unhealthy wounds in other parts of the body, and which is familiarly termed "proud flesh." No means being taken to check this exuberant growth of granulation tissue, and the eye itself from its atrophic condition being highly unfavourable to any healing process, the granulations constantly increased in number, and spreading over the cornea formed a cap, which in course of time, by mere accumulation and a heaping up of the granulations, assumed the form of a definite tumour. As growth would take place only from the centre, so the excrescence would be conical in shape, and recently formed granulations would be embodied in the centre or core of the growth, whilst the external layers would be formed by those of longer standing. As each granulation became displaced by another from the centre, it would become pressed upon, so that the cells would first become stratified, and ultimately, by pressure and the action of the air, would be converted into a hard and horny material, such as we have seen is the consistence of the external layers of this growth. Further, on account of its single central attachment, the tumour would be easily detached by a slight blow, and

we should then expect to see, as we did in this instance, the fleshy central core extending up the base of the horn.

The best practical classification of human horns is that given by Mr. Bland-Sutton in his most interesting book on 'Tumours.' Mr. Sutton divides horns into four classes,—sebaceous horns, wart horns, nail horns, and cicatricial horns. Several cases of each variety have been reported as growing from different parts of the body, but, so far as I am aware, sebaceous horns alone hold a place in ophthalmological literature, and a fair number of instances of horny tumours, the result of the growth of inspissated sebum, have been recorded in connection with the cilia. Now in this case we have, I believe, an excellent example of the most rare of all the varieties of human horns, viz. of a cicatricial horn, that is a horn arising from overgrowth of granulation tissue. The few cases that have been published of this variety of horn have been associated with the cicatrices resulting from severe burns and scalds (Sutton); but possibly the literature of such cases would be more extensive if exuberant granulation tissue were allowed to grow unchecked.

The question at once suggests itself as to whether this tumour is composed entirely of granulation tissue, or whether the corneal elements, more especially the corneal epithelium, bear any part in its production. With reference to this point I may quote an isolated remark by Dr. Nuel, given, without any example, in his article on "Diseases of the Cornea," in vol. iv of Drs. Norris and Oliver's 'System of Diseases of the Eye.' Dr. Nuel, in speaking of the healing of perforating ulcers of the cornea, says "that the corneal epithelium covering cicatrices may undergo hypertrophy, and become cornified." Can such be the explanation of this tumour? is this growth nothing more than a gigantic heaping up of the corneal epithelium covering a normal cicatrix, which has become cornified? It seems to me that such an explanation is opposed to all pathological teaching. In the

normal healing of wounds by granulation tissue the epithelium of the part begins to creep over the granulations as soon as the latter are on a level with it, and capable of being successfully bridged. As soon as the epithelium has grown over, the granulation tissue organises into fibrous tissue, and a cicatrix is formed. In the condition known as proud flesh, however, the epithelium from one cause or another has not grown over the granulation tissue, and no cicatrix is formed or possible until the granulations are reduced.

If the corneal epithelium had covered the granulations in this case, a normal cicatrix would have been formed of dense fibrous tissue. It is the absence of enveloping epithelium that has permitted the exuberance of granulations, and the very existence of the tumour discounts the possibility of the corneal epithelium bearing a share in its production, and still more of its being a result of the hypertrophy of corneal epithelium.

The question may perhaps be asked, If corneal epithelium did not cover the granulations, how is it that the ulcer healed, and that leakage of intra-ocular fluids ceased? To such a question I would say that leakage had evidently continued for some time after perforation, as there was not a vestige of an anterior chamber when I removed the eye, and the iris was closely incorporated with the posterior layers of the cornea.

Lastly, it might be suggested that the chronic catarrhal condition of the conjunctival sacs would account for this growth, if aided by neglect and dirt. The eye being anæsthetic, the child hopelessly imbecile, and the parents neglectful, conjunctival discharges might accumulate upon the rough surface of a healing corneal ulcer, and thence, by constant addition of fresh muco-pus and the desiccating action of the air, spread over the eye, and in course of time be heaped up into the growth we see. Such indeed was, in my opinion, the probable pathology of the case when I first saw it; and I regarded the tumour as probably merely a collection of inspissated muco-pus, a huge

crust of desiccated leucocytes. But examination of the tumour shows at once that such is not the origin of the growth. In the first place there is no evidence that pus cells are capable of being converted into horny material, such as composes the external layers of this tumour; secondly, the cells forming the inner layers of the growth are certainly not pus cells; and thirdly, the general structure of the growth, with its soft central core and hard exterior, is directly opposed to any theory presupposing growth from without.

I hope I have made the cicatricial nature of this tumour clear, and I may add that Mr. Bland-Sutton, to whom I showed the specimen the other day, was entirely in favour of such a view. Whether it should be strictly termed a "corneal horn," that is whether the horn has any connection with the corneal elements, depends on whether we are prepared to accept as dogma the latest views of the origin of the cells composing granulation tissue, namely, that they are derived from the connective-tissue cells of the part. If so, then the growth may be justly styled a corneal horn; otherwise it is perhaps better to call it an example of a "cicatrix horn growing from the cornea." (*January* 25*th*, 1900.)

Mr. Power said he only remembered to have seen, in his experience, one well-marked case of corneal horn. In that it was a brown prominent horn, extending half an inch from the cornea, and it looked to him, as he stated when recording it at the time, like a rupial scab, of the kind which dried and came to a point. This entirely prevented the lids from closing, so he removed it. Beneath it, however, was a perfectly opaque cornea, which was altogether useless. The patient had had it for a considerable time, and the case occurred twenty or thirty years ago. It made a great impression on his mind, and he had some drawings taken of it, which doubtless were still at St. Bartholomew's Hospital.

Dr. Gruber thought it was a cicatricial staphyloma

originating in granulation tissue over a prolapsed iris, not due to epithelium of the cornea altogether, but to connective tissue, and therefore it could hardly be called a horn.

Mr. Treacher Collins said he would suggest that the way in which the horny projection was formed was as follows:—at first there had been an ulcer of the cornea, in which a large portion of it sloughed, then a mass of granulation tissue formed on the surface of the iris, which developed into a pseudo-cornea, such as was not uncommonly seen after extensive perforating ulcers. This pseudo-cornea being prominent and projecting between the lids, the epithelium on its surface became dry and scaly, as was often the case in staphylomatous corneæ. The unusual thing was that in this case the epithelium went on accumulating to an excessive extent, and it was this excessive accumulation of dry epithelium on the surface of the staphylomatous pseudo-cornea which gave rise to the horn-like appearance.

Mr. Devereux Marshall said he had seen one case somewhat resembling those mentioned by Mr. Lawson, but not so well marked. It was a specimen sent to him some few years ago by Dr. Ward Cousins, of Southsea. The details of the history he had not heard, but the general appearance of the section very much suggested to him the explanation which Mr. Collins had given, rather than that it was due to a cicatricial horn, as described by Mr. Lawson.

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4. *Corneal deposit, apparently of silver chloride.*

By Sydney Stephenson.

Frederick P—, æt. 9 (hereditary syphilis), admitted to the Hanwell Ophthalmic School, April 9th, 1900.

State on admission.—Lacrymation, photophobia, and ciliary redness, especially of the left eye. The palpebral conjunctiva of both eyes has evidently been treated surgically, since it is traversed by vicious, cicatricial bands, and slight adhesions have formed between the ocular and the mucous membrane of the lower lid. The right cornea shows some faint peripheral opacities. About two thirds of the left cornea is occupied by a curious greyish-yellow deposit, bounded above and at the sides by a well-defined sinuous edge. Below, it merges almost imperceptibly into a faintly stained portion of the cornea, which is superficially ulcerated. Elsewhere the corneal epithelium is intact, and does not stain with fluorescein. When examined with focal illumination the deposit casts a reddish-brown shadow on the iris. The undilated pupil is almost completely covered by the opacity, so that sight is only $\frac{1}{30}$ normal. After the use of a mydriatic vision is $\frac{6}{60}$. There are no synechiæ. Details of the fundus cannot be made out.

History.—In answer to inquiries, I ascertained that the lad had been operated upon for trachoma at one of the London poor-law infirmaries. The medical superintendent of that institution informed me that on March 22nd, 1900, the patient "was placed under chloroform and the growths removed with silver nitrate, and the eyes irrigated with solution of sodium chloride. Considerable inflammatory reaction followed, and slight loss of substance of the left cornea."

In explanation of the corneal deposit one may safely assume that, during the application of lunar caustic to the eyelids, the cornea was accidentally touched, and that a deposit of silver chloride took place locally. The present colour is presumably due to the reducing influence of light upon the deposited silver salt.

Finally, the fact may be mentioned that the deposit is becoming less dense. Vision (with dilated pupil) is now $\frac{6}{18}$, and details of the fundus can be imperfectly distinguished. (*Card specimen. May 3rd,* 1900.)

The President asked what was the injury? Did Mr. Stephenson think it was a virgin cornea? He had a similar case many years ago in which the cornea was injured by nitrate of silver. A medical man had been treating a granular lid in a very nervous patient with a solid stick of pure nitrate of silver. The patient became very restive, and broke away from the doctor, breaking the piece of caustic, which remained for some moments tightly locked between the lid and the cornea. A large corneal opacity formed, but there was not the metallic appearance described by Mr. Stephenson. The opacity became very much less, so that, though they could not hope in the present case it would disappear entirely, it would, he thought, get very much better. He would be inclined to give the case another six months without operative interference.

Mr. Johnson Taylor asked whether it would not be possible to pick a little of the metallic deposit off the pupillary area; it looked somewhat like porcelain.

Mr. Stephenson, in reply, said he imagined that the cornea was accidentally touched with the solid nitrate of silver stick at the time the lids were rubbed with that substance. He was anxious to show the patient in an unaltered condition; and as the sight had already improved in the absence of treatment, he hoped it would continue to do so. He would watch the case further before considering operative measures.

Postscript (July 16th, 1900).—L. V. = $\frac{6}{12}$, ij letters; No $\frac{1}{1}$ at 13 cm. With dilated pupil V. = $\frac{6}{12}$, iij letters. Main mass of the opacity unaltered, but the fainter opacity lying below that first named is fainter than it was; hence the improvement in sight.

IV. DISEASES OF THE IRIS.

Iritis, a sequel of gonorrhœa.

By John Griffith.

Mr. President and Gentlemen,—Iritis appearing during an attack of gonorrhœal arthritis, and while there is still a discharge from the urethra, is a complication of gonorrhœa fully recognised by surgeons. Formerly, however, this was not the case, and by many the iritis was attributed to the rheumatic diathesis. In the present day the joint troubles and the various muscular and fascial pains developing during an attack of gonorrhœa, and which are classed under the ambiguous title of "gonorrhœal rheumatism," are differentiated from rheumatism, and are recognised as manifestations of constitutional gonorrhœa. Other affections, as endocarditis, pleurisy, etc., which are suggestive of simple rheumatism, may complicate gonorrhœa, but though we may look upon the poison of gonorrhœa as analogous, it is not identical with that of true rheumatism.

From clinical material that has come under my immediate notice, I feel in a position to lay before you certain facts which tend to show that iritis is not only liable to present itself as a *complication*, but also as a *sequel* of gonorrhœa. By that I mean a late manifestation of constitutional gonorrhœa, after the complete disappearance of the initial local inflammation.

As a complication iritis is well known, if rare; but as a sequel it has not yet, so far as I can discover by refer-

ence to the various text-books on "Eye Diseases" and the English literature, been recognised. With hesitation, therefore, I venture to bring this subject before the notice of this Society, for fear that it should not merit your attention.

Many cases of iritis are seen every year without a satisfactory explanation as to the exact cause. For this reason I have tried during the last two or three years to assign a cause in every case, some constitutional cause—for I believe it is universally agreed that every primary iritis, apart from direct or indirect injury, is an expression of some dyscrasia—and I have been surprised by the number which might be satisfactorily attributed to a gonorrhœa contracted in years gone by.

I have notes of twelve cases of iritis which I feel convinced are dependent upon this disease, even though in some instances ten years or more have elapsed since the urethritis was acquired. The following are brief reports of these cases:

Case 1.—W. P—, æt. 34, developed acute plastic iritis in left eye, February, 1896. Had had two previous attacks, first in 1890, second in 1893. He acquired gonorrhœa in 1886. No history nor evidence of syphilis. Since the gonorrhœa he had suffered from "rheumatism" in one shoulder and both hip-joints. Also had had lumbago.

Case 2.—J. B—, æt. 24, had the first attack of iritis in right eye, December, 1898, it returned in June, 1899. Acquired gonorrhœa in October, 1897. Had, since the urethritis, "rheumatism" in both knees, left hip-joint and right ankle. It was his first and only gonorrhœa. No syphilis.

Case 3.—G. N—, æt. 27, had iritis in left eye, August 1899; no previous attack. Contracted gonorrhœa in 1894; the discharge persisted for eighteen months and

then disappeared; no second attack. Never had syphilis. Since the gonorrhœa he developed "rheumatism" in feet, knees, thighs, and arms. His doctor told him it was gonorrhœal rheumatism. He had never had rheumatism before, nor is there any family history of rheumatism. Has recently (November 4th) returned with iritis in his right eye.

Case 4.—R. H—, æt. 32, had iritis in right eye, September, 1899. Eyes never inflamed before. Contracted gonorrhœa in 1890, which only lasted six weeks; no subsequent attack. Denied syphilis; no evidence of it. Has always had good health; no illness, not even rheumatism. Iritis appeared in left eye six weeks later.

Case 5.—E. C—, æt. 30, had iritis in right eye, April, 1897. Iritis appeared in left eye ten days later. In 1887 contracted gonorrhœa. No history nor evidence of syphilis. Had malarial fever and typhoid at Shanghai, 1891. Punctate deposits were present on Descemet's membrane in each eye.

Case 6.—Mr. N—, æt. 36, married, acquired iritis in left eye, March, 1898. Had contracted gonorrhœa in 1882 or 1883; the only attack. Had suffered from "rheumatic gout" for nine years; pains in the groins, in his knees, and on the soles of his feet. Complained that his bones used to ache. No history nor evidence of syphilis. Eyes had never been inflamed before. Had punctate deposits on back of cornea.

Case 7.—J. R—, æt. 36, developed iritis in right eye, June, 1898. Denied syphilis, but admitted having had gonorrhœa seven years previously. Has suffered from pain in his left hip-joint and in the soles of his feet.

Case 8.—W. M—, a highly neurotic man, æt. 36, married, acknowledged having had both gonorrhœa and

syphilis in 1886. He had had an attack of iritis in right eye about that time, which he was told by his doctor was syphilitic. He had no recurrence till 1896, when he had another attack in his right eye. In 1899 he had a third attack in the same eye. Had suffered from rheumatism and neuralgia only subsequent to 1886.

Case 9.—T. W. H—, æt. 36, married, had a severe attack of irido-cyclitis in right eye, April, 1899; no previous inflammation of the iris. Had syphilis in 1889, for which he was under treatment for two years. Had gonorrhœa three or four times, last attack at least seven years previous to the iritis. Had been married seven years; no urethritis since his marriage. Since the gonorrhœa he had had various rheumatic pains about the body.

Case 10.—S. S—, æt. 30, married, had acute plastic iritis in July, 1899. Only one eye affected; no previous inflammation. General health always good. Denied syphilis; no evidence of it. Had gonorrhœa in 1887; no subsequent attack. Never had rheumatism.

Case 11.—H. W. B—, æt. 37, married, developed iritis in left eye, August, 1899. Three previous attacks; first in 1895. Contracted gonorrhœa in 1885, followed by gonorrhœal rheumatism. Denied syphilis, nor could any history of it be elicited. Never had had rheumatism before the urethritis.

Case 12.—S. R—, æt. 33, married, had iritis in right eye, August, 1899. Two years previously had iritis in both eyes. In 1889 contracted at the same time both syphilis and gonorrhœa. The latter was very troublesome and lasted several months, but was eventually cured. In 1894, without any fresh urethritis, he suffered from "rheumatism" in both knees; the first and only attack. No history of any recent illness.

The gonorrhœa was contracted in these twelve cases some time previous to the iritis, with two exceptions, Case 2 and Case 8. In the former the first attack of iritis presented itself only fourteen months after the gonorrhœa was acquired, and it is more than likely that a chronic urethritis still existed, in which case the first iritis must be regarded as a complication. The iritis recurred a year later without a repetition of gonorrhœa, and with a denial of any gleet. This second attack might safely, in my opinion, be regarded as a sequel. In the latter, Case 8, syphilis complicated gonorrhœa, and the iritis which appeared in the secondary stage, during the syphilitic exanthem, was without much doubt syphilitic iritis. The subsequent attacks, in the absence of other ætiological factors, must be regarded as either syphilitic or gonorrhœal. If the former, we must acknowledge that syphilitic iritis is prone to recur, a feature considered characteristic of the rheumatic type of iritis. In this case, as in many others, the rheumatic pains developed subsequent to the attack of gonorrhœa, and recurred repeatedly. Prior to 1886 he had never had rheumatism. If we are to look upon the recurrent rheumatic pains as gonorrhœal in origin, surely we are justified in offering a similar explanation for the recurrent attacks of iritis.

The time that elapsed between the gonorrhœa and iritis in the remaining ten cases was as follows :—Case 1, four years. Case 3, five years. Case 4, nine years. Case 5, ten years. Case 6, fifteen years. Case 7, seven years. Case 9, at least seven years. Case 10, twelve years. Case 11, ten years. Case 12, eight years.

Out of the twelve cases syphilis could be excluded in all but three. In one, the case just referred to, syphilitic iritis was seen ; in the other two there was no attack of iritis till eight (Case 12) and ten (Case 9) years respectively, subsequent to the chancre. Were these two cases examples, of that rare form of iritis seen in the late stages of syphilis such as have been recorded by

Brailey in the 'Transactions' of this Society? I do not think so, because in all three cases rheumatic troubles presented themselves subsequent to the attack of gonorrhœa. They had never had rheumatism beforehand. Moreover one of the cases (Case 12) presented a recurrence.

In Brailey's five cases, which occurred late in acquired syphilis, there was one which had a recurrence. No reference whatever, either positive or negative, is made by him with regard to rheumatism or gonorrhœa. If gonorrhœa cannot be excluded, I see no reason why these cases should not be classed with mine.

There was a definite history of "rheumatism"—so-called—in nine out of the twelve cases. In eight of the nine there was no "rheumatic" attack till after the urethritis. In one (Case 7) this interesting point was not elicited, but the character of the pains is strongly suggestive of "gonorrhœal rheumatism." Out of three without a record of rheumatism, two gave a definite negative history, one of which had a recurrence of iritis. In all three syphilis was positively excluded. Nettleship points out that occasionally iritis, as a *complication* of gonorrhœa, may occur without rheumatism. Why, then, should it not occasionally occur as a *sequel?*

It seems more than probable that many of these cases would have been diagnosed as instances of rheumatic iritis, and treated as such. The more I see of rheumatic iritis the more sceptical I become of the real rheumatic nature of the affection; and, without wishing to thrust my views too obtrusively before you, I cannot help expressing a belief that a great number of the cases of so-called "rheumatic iritis" are gonorrhœal in origin.

To hold such a view it is necessary to regard gonorrhœa as a constitutional disease, and one which may at almost any date provoke a late manifestation; in other words, a disease as constitutional and as difficult of eradication as syphilis.

To sum up the chief points a few words will suffice:

1. An attack of iritis, prone to recur.
2. Gonorrhœa at some antecedent date.
3. "Rheumatic" pains, either arthritic, muscular, or fascial, developing subsequent to the urethritis.
4. Exclusion of other causes of spontaneous iritis.

Though in some of my cases it was impossible to exclude a very protracted gleet, in the greater number there was every reason to believe that the urethritis was a thing of the past, and that a considerable period had elapsed since the final disappearance of the gonococcus.

Yet another point I must emphasize. I do not wish to imply that gonorrhœa, or rather its poison in the system, is the precipitating cause of the iritis; many agents may determine the attack, *e. g.* exposure. Exposure, perhaps, more often than any other; but I contend that this in itself would be harmless was it not for the reduced tissue-resistance of the body wrought by the gonorrhœal poison, a feature parallel in every respect to that of a gumma in syphilis. A slight injury to a bone, in itself insignificant, is prone in a syphilitic subject to create a large periosteal gumma.

In conclusion, allow me to quote a case which is much allied to those I have mentioned. A youth at the age of eighteen contracted gonorrhœa, which lasted over three months. Three months from the date of infection, while the gonorrhœa was still upon him, he was knocked down with a severe attack of pleurisy, and during this illness his urethritis disappeared without any complication and without the passage of a catheter. Eight years later he was again laid up with pleurisy on the opposite side to that first attacked, without a second gonorrhœa. Before the urethral trouble he had never had rheumatism, but since the gonorrhœa he had frequently suffered from rheumatic pains in joints, muscles, and in the plantar aponeurosis.

Was the pleurisy a coincidence or not? Personally I regard the first attack as a complication, and the second a sequela of the gonorrhœa. In the same way I hold that

iritis may either be a complication or sequela of the same disorder. (*November 9th*, 1899.)

The PRESIDENT said Mr. Griffith's paper was a very interesting and original one, and evidently the author had the courage of his convictions. It was a little more than a generation since Sir John Simon issued his well-known report on contagious diseases, and rather astonished the medical world in those days by alleging that the sequelæ of gonorrhœa would be found almost as serious as those of syphilis. That statement was very much traversed at the time, and perhaps there were still many who held that it was incorrect. At the same time they now knew more of the ultimate results of gonorrhœa than they did then; gynæcologists had unravelled a good many skeins for them, and it was no longer thought that gonorrhœa was limited to ophthalmia and an affection of the male urethra. He (the President) could not go so far as Mr. Griffith in attributing all cases of iritis to gonorrhœa instead of to rheumatism. It was significant that all the twelve cases mentioned by Mr. Griffith were males. In what category were they to put the ladies who had consulted them from time to time for attacks of iritis which were proved not to be syphilitic? Were they obliged to regard them as gonorrhœal? At the same time the paper had opened out a very interesting field for observation, and no doubt they would all keep their eyes open, and perhaps would be able later to relate their mutual experiences.

Mr. TREACHER COLLINS said that some years ago, in association with Mr. Silcock, he inquired into the constitutional history of a hundred cases of primary iritis. Out of those hundred he found that iritis had commenced in connection with gonorrhœal arthritis in fourteen. The cases of gonorrhœal iritis seemed to be of the most relapsing type, and the intervals between the recurrent attacks varied very considerably—from a few months to several years. He had never met with a case of iritis

which he could attribute to gonorrhœa without any arthritis. Mr. Nettleship* had stated that he had seen such cases, but he (Mr. Collins) had not done so. He had notes† of one case in which the iritis preceded the arthritis by a short time. The patient had gonorrhœa, then iritis, then arthritis. In that case, however, he had only the patient's statements to rely on, and had not the information from direct observation. He had seen a case of iritis in connection with arthritis fourteen days after the commencement of gonorrhœa. In another case one eye was attacked at the time of the arthritis, but the second eye was not attacked until three years later. Again, he had published notes of three cases, in all of which there was gonorrhœal arthritis; in one the iritis did not occur until four years after; in another case eight years after; and in the third case twenty-one years after. To him it was very difficult to believe that iritis twenty-one years after could be attributed to the gonorrhœa; there must be something else. They knew that only certain patients with gonorrhœa got arthritis. It had been pointed out by Berkeley Hill and Jonathan Hutchinson that people who had gonorrhœal arthritis were frequently the descendants of those who had suffered from undoubted attacks of gout. He inquired into the family history of fifteen cases of gonorrhœal arthritis who had iritis, and found an undoubted family history of gout in five of them, which, considering how difficult it is to get a family history of disease, he thought was a large proportion. If the patients with arthritis were the subjects of inherited gout, he thought the iritis occurring later might be attributable to inherited gout rather than to the gonorrhœal attack.

Mr. Brailey was familiar with iritis in connection with gonorrhœa, the attack being generally associated with a gleety discharge, or some local urethral irritation, and

* 'Diseases of the Eye,' 5th edition, p. 12.

† For details of this case see 'International Clinics,' vol. iii, 8th series, p. 297.

having *nearly always* been preceded by joint disturbance. Also he had described in the recent 'American System of Diseases of the Eye' another form of iritis occurring in the acute stage of gonorrhœa, this sometimes causing gelatinous masses in the anterior chamber, such even simulating a dislocated lens. But he regarded with suspicion the theory that an iritis presenting no distinguishing appearances and no definite date of onset might follow any and every gonorrhœa as its direct consequence.

Mr. Griffith, in reply, said his object was to show that iritis might occur as a sequel, and not as a mere complication of gonorrhœa. Mr. Brailey had said that he had often met with such cases, but evidently they had not been published. He (Mr. Griffith) asked whether they were not cases of complication, not sequelæ? Mr. Bower had asked the question as to miscarriages in the case of men's wives. Though it was a delicate matter he had satisfied himself that syphilis was not present, and he had been anxious to exclude that disease as much as possible. He was glad Mr. Treacher Collins admitted the nature of late gonorrhœal iritis, and that he had met with cases similar to those he had described. He would certainly look out for a gouty heritage.

Fig. 1.

M. H. Brooks, *del.*

Fig. 2.

Bale & Danielsson, Ltd., Chromo-Li

PLATE III.

FIG. 1 illustrates Mr. Reginald E. Bickerton's case of a peculiar Form of Affection of the Choroid (p. 93).

FIG. 2 illustrates Dr. Rayner Batten's case of Superficial choroido-retinitis of peculiar form and doubtful causation (p. 95 ; also 'Ophth. Soc. Trans.,' vol. xvii, p. 62).

V. DISEASES OF THE RETINA AND CHOROID.

1. *A peculiar form of affection of the choroid.*

By Reginald E. Bickerton.

(With Plate III, fig. 1.)

John S—, æt. 29, warehouseman. Patient attends Moorfields Hospital under Mr. Treacher Collins. Complains of seeing "mist and flames" before right eye.

Vision $\frac{6}{6}$ with either eye, also J. 1. Fields of vision very slightly contracted for white. Still more so for red and blue, and greatly contracted for green; colour vision good. Pupils react normally to light and accommodation. Media clear, no vitreous opacities.

Fundus—Discs.—Physiological cupping. Vessels normal in contour and proportionate size.

Macular region somewhat brighter than surrounding fundus, and occupied by a collection of yellowish-white dots, somewhat resembling Tay's choroiditis; these dots do not seem to be arranged in any particular stellate form. The fovea has escaped any change.

Retina slightly striated over the affected region below the disc. Retinal vessels lie in front of the patches.

The choroid is occupied by yellowish-white coloured patches, collected chiefly above, below, to the outer side of, and immediately in relation with the disc. The great mass of them lie in the region traversed by the superior and inferior temporal branches of the artery, and in that of the superior nasal branch. The region

traversed by the inferior nasal branch is practically free from them, also the immediate inner side of the disc. The patches above and to the outer side are mostly separated from each other by bands of altered choroid, there being a conspicuous absence of pigment deposit. Those below the disc are much more confluent. The sclerotic is not exposed on the floor of the patches, and the choroidal vessels are completely hidden by them. The patches are not raised above the level of the surrounding fundus, and they lie entirely behind the retinal vessels, which are clearly seen crossing the patches.

The extreme periphery of the fundus appears to be free from any change whatever.

History.—No specific history. History of scarlet fever; rheumatic fever; cough, night sweats and wasting. Lupus of left ear and stone in kidney.

Urine clear, slightly acid reaction. Sp. gr. 1018. No albumen. No sugar. Albumen has never been found to be present in his urine.

Family history.—Father and mother alive and healthy. Has nine brothers and sisters; one died of whooping-cough, the rest healthy. According to his account none of his family have defective vision.

Remarks.—The condition is roughly symmetrical in either eye. Absence of sufficient history to account for the condition. Normally acute vision. The above leading to the opinion that it is some congenital affection.

(*Card specimen. October 19th*, 1899.)

Dr. Stephen Mackenzie said that Mr. Bickerton's was a very guardedly expressed diagnosis—"A peculiar form of affection of the choroid." He (Dr. Mackenzie) thought the case of very unusual interest, at any rate from the physician's point of view. Physicians, of course, saw many cases of choroiditis, and he would have liked to have elicited some information from other members of the Society as to the essential nature of such a

ondition. Mr. Bickerton had implied, if not actually sserted, that it was probably congenital in nature. At ny rate the evidence from the appearance of the disease ould be rather in favour of that than of an inflamma- on, because he thought, that those who had seen the yes would recognise, that the absolute absence of dis- rbance of choroidal pigment was very unlike what was sually seen in choroidal inflammation. He did not esire to criticise the case at all, but, as far as he could dge, the retina over the choroid seemed practically, if ot absolutely, unaffected. The vessels of the retina eemed but little affected, if at all, and he rose in order o ask whether others were familiar with such a form of ffection of the choroid.

Dr. Rayner Batten said that he showed and reported, ith Mr. Holthouse,* a case before the Society almost xactly similar in a woman aged twenty-five. There as nothing very particular about the family history. he was subject to epileptic fits, but they did not seem o affect her general health. She was one of a family f twenty-four. She had similar changes in the macular egion to those of Mr. Bickerton's patient, but she had ll vision (Pl. III, fig. 2).

In reply to Dr. Stephen Mackenzie, Dr. Batten said ere was absolutely no disturbance of choroidal pigment.

* 'Ophth. Soc. Trans.,' vol. xvii, p. 62.

2. *Detachment of retina and choroid ; retention of visio in the detached retina.*

By W. T. Holmes Spicer.

Eliz. H—, æt. 29, teacher. Was first seen on Noven ber 29th, 1899. Two months before she suddenly foun the sight of left eye was dim; she discovered it on closin the right eye. She had not recently tested the le alone, so that she did not know how long it had bee dim, but she had had glasses given her at another ho pital five years before, and at that time there had bee no great difference between the two eyes. Her glass were —7.

R. V. $< \frac{6}{60} - 8$ sph., $\frac{6}{6}$, J. 1. L. V. $< \frac{6}{60} - 8$ sph., $\frac{6}{6}$ She was otherwise in good health, and had no di comfort in her eyes; she was subject to occasiona migraines, with photopsia.

The retina of the left eye is entirely detached over th whole temporal region; it is a gradual shelving detach ment, nowhere steep. It is not completely opaque any where, but there are places where it is cloudy. At th upper part of the detachment there is some atrophy o the superficial layers of the choroid, with new pigmenta tion, and a similar change at the lower part less marked The retinal vessels have lost their light reflex, and th veins appear as black cords. Outside the yellow spo the detached retina can be seen with + 4 D., so that th retina is detached here probably to the extent of 4 mm if the previous estimate of the refraction was correc With this same glass, + 4 D., the even striping of th choroidal pigment can be seen quite clearly, islands o normal pigment with the clear lines of choroidal vessel running between them. This appearance is not to b seen all over the detached area of the retina, but onl for some distance around this centre.

The visual field is very nearly full to white; thi

probably explained by the sustained nutrition of the tina from the choroid, with which it is in contact.

(*Card specimen. January 25th*, 1900.)

Embolism of central artery with escape of a triangle bordering temporal side of disc.

By A. H. Thompson.

F. C— (a patient of Mr. Lang's at Moorfields), æt. 16. very anæmic girl. Acute rheumatism two years ago llowing scarlet fever, since when she has been subject rheumatic pains. No heart murmur detected.

On October 20th, 1899, on waking, the right eye was und to be "blind." There had been a sensation in e night as though something had "gone crack" in the e. She thought her sister, with whom she was sleeping, had struck it.

On examination, the right pupil reacted to direct light ly when proceeding from straight in front. It was ite insensitive to light from any other direction. This ndition persists.

V. { R. A finger with difficulty. Small field corresponding to red area.
L. $\frac{6}{6}$ Hm. 0·5.

Ophthalmoscopically, right fundus was typically pale, ith cherry-red spot at macula, but also with a red iangle bordering temporal edge of disc, and reaching ore than halfway to macula. This triangle had a ell-defined œdematous border. No cilio-retinal vessel uld be seen at first. The veins could be emptied on e disc by slight pressure, but no arterial pulsation was oduced.

Subsequent progress.—The contrast between functional iangle and rest of retina has become less marked, and

the border of the triangle less definite. Vision an field have remained stationary. A minute vessel curlin outwards, from a point between the centre of the dis and its temporal edge, is noticed. The macula in it outer half has become studded with white squarish dots Beyond the macula a few small round dots (? hæmor rhages), also one or more cholesterin crystals, and som white degeneration in the wall of a minute vessel. A the arteries are very much reduced, but the two tem poral ones less so than the two nasal ones. Slight pres sure now produces pulsation of the central artery at it entrance into the disc.

The patient, who has been taking Blaud's pills for si weeks, is less anæmic than she was.

(*Card specimen. December 14th*, 1899.)

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4. *Case of occlusion of the central retinal artery in each eye.*

By W. H. Jessop.

(With Plate VI, fig. 1.)

M. H—, æt. 35, married, came to St. Bartholomew' Hospital on October 28th. On waking up on Octobe 24th found she could not see with right eye; the visio was normal the evening before. She has never ha anything the matter with the eyes, or even any pai in the eyes; has had no obscuration of vision at an time. She had a bad attack of influenza nine year ago, and since then has had headaches occasionally. N history of rheumatism. Two years ago attacks of epi staxis—two or three times for twelve months, but ha never fainted. Could obtain no specific history. Ha been troubled much with cramp in legs.

She is a healthy-looking woman, has been marrie

twelve years, and has not been pregnant for eleven years; she had twelve years ago a miscarriage, and then a nine months' child which only lived one hour. She was carefully examined by Dr. Ormerod and Dr. Herringham, and no signs of heart disease or even of arterial degeneration could be made out.

Urine 1018; no albumen; no sugar. Catamenia regular, and no history of menorrhagia. Family history discloses nothing, and I have seen her husband and found out nothing from his history.

Right eye: Optic disc: colour yellowish white; edges indistinct. Retina, pale and œdematous, especially near disc, except for a disc's breadth from optic disc on temporal side, where the retina is much redder and more natural-looking, though no cilio-retinal vessel is to be seen. At yellow spot is the typical cherry-red spot. The arteries are thread-like and contain apparently no blood.

V. doubtful perception of light.

Left eye: Media and fundus natural, the retinal vessels were carefully examined and showed no suspicion of pathological changes.

V. $\frac{6}{6}$ J. 1 at 30 cm.

Treatment.—Hydrarg. c̄ Cretâ gr. j twice a day after meals, which was continued till November 2nd.

November 3rd. Right eye: Appearance the same except that there is a linear hæmorrhage over the obliterated inferior temporal artery.

Medicine altered to a mixture of perchloride of mercury and iodide of potassium, to be taken three times a day after meals.

November 13th. Right eye: Optic disc pale, especially at outer side, and some new vessels below on the disc.

Fundus red has partly returned, but still redder in patch at outer side of optic disc. Cherry-red spot scarcely to be seen. The retinal arteries now contain blood; but cannot be traced at periphery.

December 4th. Right eye: At yellow spot is a small round yellowish retinal spot.

Above the optic disc, at about one disc's distance, is a large black pigment spot.

December 20th. Right eye: Optic disc white, atrophied-looking, cupped at outer side, with some filling up of the physiological cup; two or three new small interstitial vessels.

Retinal veins normal in size.

Retinal arteries:—Superior temporal has the sheath thickened and white for about two discs' breadth from the optic disc; the thickening is not uniform, and a red streak can be seen near the centre in parts. Sheath of inferior artery is white on disc; inferior temporal of crossing its vein has a broad streaky white patch on it sheath and along one small branch.

The other arteries and all the arteries at the periphery are represented by white streaks.

At yellow spot are three small glancing white spots the pigment patch as before.

Pupil dilated 5 mm., a little larger than left, and acts sluggishly, though slightly, to light.

Patient came to hospital and was admitted on January 1st, 1900, complaining that at 11.20 a.m. on December 28th when sweeping out a room, she suddenly could not see with left eye, and is now completely blind.

Vision: Right eye counts fingers in small portion of field; left eye no perception of light.

Left eye: The ophthalmoscope reveals all the classical signs of embolism of the central artery of the retina, the general œdema of retina, especially round optic disc, small size of arteries and cherry-red spot being well marked. The veins are normal, and there are no hæmorrhages to be seen.

She was taken into the hospital and kept at rest in bed, put on low diet, and ordered inunction of mercurial ointment every night till January 20th. The mercurial treatment never salivated her.

January 4th.—Patient says she can see much better with right eye and vision found to be $\frac{6}{36}$. Field of vision

ery small and restricted by 10° circle, but difficult to ake from her faulty fixation power.

16th. Left eye: Still redness about yellow spot. bove it are numerous yellow-white, glancing, minute tinal dots, whilst below it are several small hæmorrhages. undus red returning. Retina still œdematous-looking. uperior artery is a good size and contains blood, and an be made to pulsate. Superior temporal has white hanges on sheath near disc, and becomes small, though raceable, at periphery; superior nasal same size as emporal, but no white lines. Inferior artery is fair ize; inferior nasal is obliterated; inferior temporal mall size.

March 7th.—Patient says she can at times see objects assing in front of left eye, but I could not be satisfied n this point. Left pupil 5 mm.; does not act to direct ght.

Left eye: Arteries contain blood again, but much contricted at periphery.

Patient has been kept on mercurial and iodide of otassium treatment till now, but the condition in both yes remains stationary as to vision and ophthalmoscopic ppearances. V. R. $\frac{6}{36}$.

Left eye: No perception of light; the patient declares he can see light at times. Both pupils are dilated, and bout 5 mm., the right being a little larger than the left. The right pupil acts slightly to light; the left pupil does ot act to direct light.

This case is one of interest from the rarity of both eyes eing affected in this manner. The attacks in each eye ere sudden, without any premonitory ocular symptoms, ven such as obscuration of vision, and with all the lassical signs of embolism of the central artery of the etina.

It seems almost impossible to imagine emboli finding heir way into both central arteries; such a condition

would almost mean a process of natural selection, as anatomically the paths are so separate.

The other reasons against embolism in this case are that the patient shows no evidence of heart disease, lung trouble, atheroma, or arterial disease elsewhere, not even increased arterial tension in the radial pulse; and there is no history of septic trouble. There is no history of rheumatism or of renal mischief. The urine was examined most carefully several times. She has never been anæmic or suffered lately from excessive loss of blood. The only illnesses have been an attack of influenza nine years ago, and two years ago she had epistaxis two or three times a week for nearly a year.

The question of syphilis has been very carefully considered, and the only facts in the history at all suggesting it are that she had a miscarriage soon after marriage, and then a nine months' child, which only lived one hour, and that she has not been pregnant since. It must also be borne in mind that the vision in the right eye improved under mercurial treatment from doubtful perception of light to $\frac{6}{36}$, with a small central field of 10°.

The fact of all cases showing the clinical signs of embolism of the central artery of the retina being due to an embolus has been doubted for a long time. Looking over my notes of such cases I find that the last six have no history or signs of disease likely to produce an embolus.

Searching for other causes, we can imagine a thrombus formed in the vessel, but this would be impossible without some premonitory symptoms, as obscuration of vision, and such a thrombus could only be formed by disease of the coats of vessel, or pressure from without on the walls of the vessel.

A cause, however, which may be suggested to produce the condition is an endarteritis or arteritis, probably of syphilitic origin, affecting so gradually the arteries that the effects on the vision of the patient was not perceived. Eventually, owing to constriction of the

essel and the changes in the intima, the artery is ddenly blocked by a thrombus.

This disease of the arteries, though difficult to account or the predilection, in my case seems less hard to nderstand than separate emboli, as there were changes een suggesting arteritis in both eyes.

The cases I have been able to find showing symptoms f so-called embolism on both sides are—

Adams ('Transactions Ophth. Soc.,' vol. iii, p. 114) ecords a case of a man aged sixty-one. The interval etween the two eyes being affected was eighteen years.

Nettleship (Royal London Ophthalmic Hospital 'Reorts,' 1886, p. 265) gives notes of a case much resembling ine in a female aged thirty-six. The interval between ne attacks was twelve days. There was a history of hronic renal disease. In the right eye the inferior asal artery was converted for some distance into a white ne, with narrow blood column. There was a similar ondition in an artery in the left eye.

Treacher Collins ('Transactions Ophth. Soc.,' vol. vii, p. 324) gives the case of an anæmic girl of nineteen, n whom the attacks were of eighteen months' interval, nd a history of amenorrhœa and epistaxis.

In my own case I could find no signs before the ttack in the left eye of any changes in the arteries or eins, although I carefully looked for them. In fact, fter examining the left eye several times I told the atient that she might rest assured that though the loss f vision in the right eye was a serious deprivation, I as sure the left would not be affected in the same ay.

I would call attention to the periarteritis or thickening f the sheath of the arteries in parts in both eyes in my ase, which fact was observed in Nettleship's case above ited, and also in one mentioned by him in 'Zeitschrift f. Ielmholtz,' 1891, p. 7, and in both occurred after the acute ymptoms passed off. This marked limited condition I m not familiar with in cases of embolism. Cases with

symptoms of embolism have been examined after removal of eye, and changes found consonant with arteritis.*

(*June 14th*, 1900.)

Mr. Treacher Collins said Mr. Jessop had mentioned a case which he had shown at the Society in 1897. It was that of a woman æt. 19, who had the so-called classical symptoms of embolism of the central artery, at an interval of eighteen months, in each eye. He first saw her fourteen days after the attack in the second eye. She suffered from amenorrhœa, and for six months previous to the attack in the second eye had failed to menstruate. She had also been subject for a year to daily attacks of bleeding from the nose, which stopped a few days before the attack in the eye. Putting these points together, it occurred to him that possibly the case was one of hæmorrhage into the optic nerve-sheath, first in one eye, and then in the other. He had seen the patient several times since she was shown, and now, in one eye she had complete loss of central vision, with good peripheral vision, while in the other eye she had lost peripheral vision and retained central vision; so that with the two together she saw fairly well. Did not Mr. Jessop think that the same explanation—hæmorrhage into the optic nerve sheath—might explain the symptoms in his case, who, he stated, had also been subject to attacks of epistaxis? There were no white lines along the retinal vessels in his case.

Dr. Abercrombie said he did not gather from Mr. Jessop whether the patient had any uterine symptoms at all. In most of the published cases in women there had been such disorder. Mr. Priestley Smith many years ago traced some cases fairly clearly as due to that association. That gentlemen suggested that there was spasm of the artery lasting long enough to produce a permanent result. They knew that spasm of arteries might last long enough to produce gangrene, as seen in cases of Ray-

* Priestley Smith, 'Brit. Med. Journ.,' 1874, i, p. 452. Ridley, 'Ophth. Hosp. Reports,' 1895, p. 204.

naud's disease. Possibly in Mr. Jessop's case spasm of the central artery in each eye successively had been the cause.

Mr. Doyne said he thought that as a rule in embolism of the central artery or one of its branches, if the circulation was restored the vessel was more dilated at the periphery than towards the disc. In Mr. Jessop's case he thought they were very shrivelled at the periphery.

Mr. Jessop said in his case it was the central field which was left, and she had a vision of $\frac{6}{36}$. He thought it was much more difficult to imagine hæmorrhage into the nerve-sheath giving rise to obstruction in each vessel without further changes than to imagine an arteritis or endarteritis taking place in each. In his own case he thought it was of syphilitic origin. There was no uterine disease; in fact, as far as constitution and physical condition were concerned, they could find nothing at all. With regard to Mr. Doyne's remark, he thought Mr. Doyne would remember that very often there was dilatation, but in other cases there was complete obstruction, and some of the branches were lost. The point to which he wished to lead the discussion was as to the difference between changes due to embolus and changes due to endarteritis, because it seemed plain that all such cases could not all be caused by emboli. Why in cases in which there were emboli all over the body were there not emboli of the retinal artery? On the other hand, why should the retinal artery be occluded without any corresponding change in any other part of the body? Why in the majority of cases should the arteria centralis alone be affected without there being even any cerebral symptoms?

5. *A case of periarteritis of the retinal arteries.*

By Simeon Snell.

(With Plate IV, fig. 1.)

Martha C—, æt. 43, came to Sheffield Royal Infirmary on the 13th March, 1900, on account of failing sight of the right eye, which, commencing about four months ago, had gradually become worse.

On examination with the ophthalmoscope one was at once struck with the peculiar appearance of the retinal arteries, especially on the optic disc. They were greatly increased in size, and were almost snow-white and somewhat glistening. On more careful examination it was noticed that this appearance resulted from a sort of sheath enveloping the arteries. The condition was confined chiefly to the arteries on the expanse of the disc, and amongst those the main artery coursing downwards was more markedly affected than the others. The sheath continued to envelop the arteries from the papilla for a distance equal to barely a diameter of the disc. It was remarked that the sheath around an artery, coursing downwards, gradually shaded off, but was continued for some distance further on the posterior aspect of the artery than on the front, and into this sheath the artery coursed, like, as it were, into a tunnel. There was only one hæmorrhage, and that a small one, at a considerable distance from the papilla. The veins were unaffected. V. $= \frac{1}{60}$, which was not improved by any correction.

A similar condition to that described as existing in the right was observed as commencing in the left eye, but the whiteness was altogether very much less marked, and the appearance had more of a glistening steely look. It was more noticeable at the sides and back of the vessels than on their front. V. $= \frac{6}{9}$.

The ophthalmoscopic drawing by Mr. Head (Plate IV,

PLATE IV.

Fig. 1 illustrates Mr. Simeon Snell's case of Periarteritis of the Retinal Arteries (p. 106).

Fig. 2 illustrates Mr. Henry Juler's case of Retinal Detachment; ? Intra-ocular Growth (p. 152).

A. W. Head, *del.*

Fig. 1.

M. B. Taylor, *del.*

Fig. 2.

Bale & Danielsson, Ltd., Chromo-Lith.

fig. 1) is a faithful representation of the condition of the right eye at the end of March.

The patient's health had been good up to four years ago, since when she had been subject to epileptic fits, which recurred about every three months, lasting usually for about five minutes. During the fits there was involuntary micturition, and there was twitching of the right arm before their onset. Knee-jerks were about normal. No ankle-clonus. The hand-grip was equal on each side. There was no sign of paralysis anywhere, but she complained of weakness in the legs after the fits. Her memory is poor. My friend Dr. Cocking kindly examined her heart, and reported that there was no valvular disease, but hypertrophy of the left ventricle. The arteries were rigid and tortuous.

The urine (sp. gr. 1013) contained a small quantity of albumen, and there were granular casts.

Mrs. C— had been married twenty-four years, she had had two children, one died in infancy, the other when three years of age, and there were two miscarriages. Menstruation has practically ceased. There is no history of syphilis.

May 29th, 1900.—Since first coming under observation vision in the right eye has materially deteriorated, and the patient has now only light perception. Ophthalmoscopically the condition of the arteries is practically unaltered, but there are two hæmorrhages on the lower part of the optic disc, separated by the descending vessels.

Mules ('Trans. Ophth. Soc.,' vol. ii, p. 47) has published, with an ophthalmoscopic drawing, a case of general retinal periarteritis, and quoted similar cases on record. The scanty literature on this subject has not, since then, been materially added to as far as I can ascertain. Like Mules' and the other instances he refers to, my patient had kidney disease. The periarteritis in my case was practically restricted to the arteries on the optic papilla and its immediate neighbourhood, and,

to judge from Mules' illustration, the abnormal appearances were much more pronounced in my case than in his. The disease affected the trunk of the artery and its primary divisions. Time will show how far the changes will progress more towards the periphery. Such a case differs, of course, materially from those in which white lines are observed in the course of one or more branches of the retinal arteries, and which are more frequently observed. In Mules' case there were also numerous hæmorrhages, whereas in mine they have, up to the present, been insignificant.

(*June 14th*, 1900.)

Mr. Jessop asked whether the field of vision was taken in the case. The history was much more like that of thrombus or endarteritis than periarteritis. He thought in this case, as in the one read by him the same evening, the periarteritis was secondary, and he thought the cause was more likely to be syphilitic than any other.

Mr. Snell, in reply, said he had taken the field of vision, but it was somewhat unreliable. There was concentric contraction.

The patient had been taking iodide of potassium, but nothing except her memory had improved.

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6. *Retinal changes of doubtful nature in the macular region.*

By G. F. Still, M.D., and Donald Gunn.

Lily R—, æt. $2\frac{10}{12}$ years. Thought to have been healthy at birth, but has always shown some muscular weakness, which has become more marked during the last few weeks, when she has lost the power of sitting up unsupported, which she previously had. Has never been able to stand. Learnt to talk at twelve months, but never able to say more than a few simple words, "mamma," "dadda,"

"tick-tick," etc. No change in the mental condition noticed concurrently with the increasing weakness.

Nystagmus first noticed by the mother about two months ago.

The child was brought to the Hospital for Sick Children at the age of $1\frac{11}{12}$ for general weakness; she then had slight rickets, but not enough to account for the weakness, and the knee-jerks were absent.

Family history.—Patient is the fourth child. 1st, alive and healthy, aged nine years; 2nd, died at three months with strangulated hernia; 3rd, died at fourteen months with convulsions. Between the third and the patient there was one miscarriage at the third month. No evidence of syphilis in the mother, nor, so far as can be ascertained, in the father. The parents are not Jews; they were first cousins. No other case like the patient has occurred in the family.

Present condition.—Fairly nourished; face bears a slight resemblance to that of Mongolian imbecility. The child is rather apathetic, but otherwise looks fairly intelligent. General weakness is very marked, so that the child is quite unable to support its weight on its legs, and can only sit up with some support; the head can be held up fairly well. The limbs are flabby, but all movements can be performed, though feebly. Knee-jerks absent; plantar reflexes normal, with flexion of toes.

Eyes.—Examined by my colleague, Mr. Donald Gunn. A grey area in the macular region of each eye, and in this area a cherry-red spot. The grey area fades off gradually into the normal retina, and the whole of the fundus elsewhere is normal. The media are clear; there are about 5 D. of hypermetropia in each eye. Fine nystagmus, chiefly lateral, in each eye.

(*Card specimen. January 25th*, 1900.)

Subsequent course.—The child showed little change until July, 1900. The mother thought that the general

weakness was increasing, but this was hardly definite; the sight remained apparently good. No changes in the eye symptoms were detected, but as examination of the fundus was extremely difficult, and the case was not seen again by Mr. Gunn, this was uncertain. On July 10th the child was readmitted to the Hospital for Sick Children for observation; she was rather fretful, but otherwise seemed in her usual health. The temperature for a week after admission varied from 97·6° to 100·2°; it then began to rise without any apparent cause, and in forty-eight hours reached 107·6°, and the following day, July 19th, was 108·2°. With this rise of temperature there was some general rigidity, and the child gradually became unconscious and died. There was no vomiting or diarrhœa, and no convulsions. The weather at the time was intensely hot.

Post-mortem examination showed nothing definitely abnormal to the naked eye. The brain and one of the eyes were reserved for microscopical examination.

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7. *New growth in macular region, (?) tubercular.*

By J. B. Lawford.

Abraham D— (a Jewish child), æt. 9, sent to Moorfields Hospital on account of defective vision.

Patient is the third of nine, of whom six are living. The second child died aged six days. Of the other two deceased, one lived only half an hour; the other, a twin, died aged eleven months.

Patient always "delicate." Has had no definite illness. Was operated on at London Hospital, probably for adenoids. Has also had discharge from ears. Is not deaf.

No examination of thoracic and abdominal organs has yet been made.

One maternal uncle died when aged nineteen of "consumption." No other family history of disease.

Right eye.—In the macular region is a large irregularly shaped whitish opaque mass. It is covered by retina, raised unevenly (about 5 D. at highest part), sharply defined above and below, but with ill-defined margins on nasal and on temporal side. The retinal vessels over it are very plainly visible, and are perhaps larger than normal. There is no hæmorrhage on the large patch.

On the temporal side of the main patch there are several areas of retinal exudation, whitish in colour, very slightly lustrous, and flat, or nearly so. They vary in size, but are all much smaller than the central one. In connection with two or three of these patches, there are curious alterations in the retinal vessels, chiefly or wholly in the veins; some of the veins appear varicose, and on at least three there are what look like aneurismal dilatations. Several small blood extravasations are also visible.

The left eye is hypermetropic, but shows no opthalmoscopic signs of disease.

(*Card specimen. March 8th,* 1900.)

P.S.—June 16th, 1900.—The ophthalmoscopic appearances have undergone little alteration. The surface of the raised patch is now more uneven and "billowed," and the general colour is slightly rusty. The edges are as sharply defined as before. No hæmorrhages have appeared on the surface, and the opacity of the raised area is as dense as when first seen. The patches of exudation in the retina to the temporal side of the large lesion are still present, and the beaded appearance of some of the vessels in this part is very noticeable.

The child is in good health, and has developed no symptoms other than defect of sight of the right eye.

8. *A case of septicæmic meningitis and double panophthalmitis.*

By A. Quarry Silcock.

The interest in this case lay chiefly in the fact that both eyes were affected by a diffuse inflammatory change (panophthalmitis), the result of general septicæmia, and in so early a stage of the latter as to constitute one of its most prominent signs.

The man, æt. 35 years, was admitted to St. Mary's Hospital, under the care of Dr. W. B. Cheadle, on October 14th, 1899. He was well and at work till October 4th, when he got wet through, and was taken ill in the evening with pain in the left side and shivering fits. Since then he had kept his bed, and been attended by a doctor. He had had severe and persistent headache, repeated shivering fits, and a cough with expectoration, at first "white" and then blood-stained, and had been delirious at night. Since October 7th he had also had severe and persistent pain in the back of the neck.

He had been a heavy drinker, but his health had been good, except for an attack of rheumatic fever four or five years previously. He was confined in a lunatic asylum for six weeks five years ago. No history of syphilis.

He was a muscular, well-nourished man when he was admitted, with an anxious expression, conscious, and answering questions intelligently, complaining of severe headache and pain in the left side of the chest. Temp. 101°, pulse 120, resp. 36. Skin hot and moist; tongue dry and heavily coated. Tremor of hands.

Heart.—Apex-beat fifth space, just inside vertical nipple line, feeble diffuse impulse, no murmurs. Aortic second sound at base very weak; pulmonic second sound accentuated.

Lungs.—Diminished movement, impaired resonance, and poor entry of air at left base, with few crepitations on upper part of lung behind; no tubular breathing. Right side of chest normal.

Urine.—Sp. gr. 1015, acid, pale yellow; small amount of albumen present. During the night the patient was very restless, and passed his urine into the bed.

On October 15th, the day after admission, it was noticed that the right eye was much inflamed. The cornea was infiltrated by yellowish exudation. The aqueous humour was turbid, and there was slight hypopyon. The pupil was small, and adherent by lymph to the front of the lens. The iris was also covered with a thin layer of lymph. The conjunctiva was œdematous, and there was great engorgement of the subconjunctival vessels.

Left eye.—Pupil reacted to light. Media hazy so that the fundus could not be seen. On the lower part of the lens in the pupillary area was a thin layer of purulent lymph. Tension, normal in both eyes.

The patient was in a semi-comatose condition throughout the day.

On October 16th he seemed better, and was again conscious. There was extreme rigidity of the muscles of the back of the neck, and occasional twitchings of the right side of the face, but no paralysis of extremities. Temp. 99·2°, resp. 32, pulse 120.

The right eye was proptosed and in a condition of panophthalmitis with increased tension, so Mr. Silcock, after consultation with Dr. Cheadle, decided on its removal, as it could never be of any further use; and it was also thought that bacteriological investigation might throw some light on the nature of the infection. The patient was therefore anæsthetised, and the eye was removed by Mr. Silcock. No pus was found in the orbit. In the evening, at 10 p.m., temperature rose to 104°, and the pulse was 156; respirations 40, the patient being in a semi-comatose condition.

October 17th.—Patient in much the same condition. Temp. 104°, pulse 148, resp. 60. Some purpuric spots on the chest and back, one as large as a sixpence below the right clavicle. The patient got rapidly worse, and died at 3.55 in the afternoon.

Autopsy : Brain.—On the surface of the cortex along the sides of the longitudinal fissure, and at the base of the brain around the optic chiasma, were patches of the thick yellow lymph. The upper part of the spinal canal was free from lymph, but in the lower dorsal and lumbar regions there was extensive hæmorrhage into the sub-arachnoid space.

Heart.—On one of the cusps of the aortic valves was a recent polypoid vegetation about the size of a pea. The mitral, tricuspid, and pulmonic valves were normal.

Lungs.—About two thirds of the lower lobe of the left lung was consolidated, and sank in water. Microscopic examination showed extensive hæmorrhage into the alveoli, with areas of pneumonic consolidation.

Spleen.—Enlarged. In the lower half was a large infarct about the size of a walnut.

Liver.—Enlarged and fatty.

For the foregoing notes I am indebted to Dr. John Broadbent, Medical Registrar, St. Mary's Hospital; for the following account of the bacteriology of the case to Mr. H. I. Plimmer, Pathologist to the hospital.

Eye examined 17th October. Cover-glass preparations made from purulent material showed a pure culture of *Streptococcus lanceolatus*, which was confirmed by culture experiments, all of which (five) showed the same organism in a pure state.

Purulent lymph from surface of brain showed the same organism.

Vegetation on aortic valve showed the same organisms.

There was no lobar pneumonia.

Streptococcus lanceolatus was found in the eye after an injury thereto, by Mündler, 'Ziegler's Beiträge,' xii, 2, p. 246.

Uhthoff and Axenfeld ('Lubarsch's Ergebnisse der allg. Pathologie,' p. 139) state that the *Streptococcus lanceolatus* in this connection is very important. The eye affections are often less violent than those from other pyogenic organisms, and often lead, without panophthalmitis and perforation into phthisis bulbi.

Axenfeld had four cases: two with meningitis, and one with cryptogenic pyæmia after cold, and one with cholelithiasis.

Report of left eye removed post mortem from Mr. Silcock's case of suppuration of both eyes, by C. D. Marshall.

The eye was hardened in formol. The cornea is clear and the anterior chamber is of about normal depth in the middle, but the periphery of the iris is pushed up against the cornea, thus closing the angle of the anterior chamber; there is a dense layer of lymph stretching across the pupil.

The lens is *in situ* and is clear. The vitreous is clear in parts, but stretching forwards from the optic nerve, and running along the retinal vessels are streaks of suppuration; on one side they do not extend far, but on the other side they rapidly blend with an extensive area of suppuration, which affects the choroid and retina, and the part of greatest inflammation is the ciliary body.

There are one or two outlying foci of suppuration, and the whole appearance suggests an embolic condition.

At one place several foci have united and have led to the larger suppurating area mentioned above.

Microscopic examination.—The iris and cornea are adherent for part of their extent.

There is much purulent exudation extending through the vitreous, and this is most marked in the ciliary region.

The vessels are at places engorged, and the inflammatory condition is most intense in these regions.

It will be observed that Mr. Marshall states, from his examination of the left eye, that the lesion was embolic in origin, but it must be remembered that there was a direct continuity of inflammatory infiltration, from the meninges of the brain to the optic nerves, and their sheaths, and to the uveal tract. No doubt the uveitis was secondary in point of time to the meningitis, for there had been pain in the head and sickness long before the eyes were obviously affected, but the question as to whether the panophthalmitis was due to direct infection from the meninges or from the blood must remain undecided.

The proptosis of the right eye was clearly due to œdema of the orbital contents, for no other explanation of the condition was apparent at the post-mortem examination.

(*March 8th*, 1900.)

The President was inclined to think that the eye was affected as the result of general septicæmic change. Certainly the case was a very unique one. Most members had had cases where one eye had been lost in association with septicæmia, but he had never seen a case, nor heard of one till that evening, where both eyes were lost through it.

Mr. Holmes Spicer said that Mr. Silcock had raised the point about the rarity of the affection of both eyes in septicæmia. He remembered the case of a woman of thirty-one years of age, who suddenly found the sight of her right eye affected; on examining the eye there was a grey nodule in the iris, a hazy cornea and a hypopyon; the eye rapidly went on to suppuration, and was entirely lost. Six days after the left eye was attacked in the same way and also destroyed. About the time of onset of the attack in the second eye she

was taken with labour pains, and was delivered of a placenta and membranes, within which were the remains of a fœtus of about three months' development. The general signs of pyæmia were not marked; the temperature was raised for a short time, but it was concluded that the affection in the two eyes was pyæmic, probably embolic, and that its source was the decomposing fœtus in the uterus.

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9. *Destructive uveitis accompanying cerebro-spinal meningitis.*

By F. R. Cross.

On November 16th, 1899, I saw Master M. B—, æt. 12½ years. His *right eye* was quite perfect.

The *left* was congested and degenerating; T. —1, globe somewhat shrunken; no anterior chamber; iris bombé; pupil occluded and lens cataractous.

The eye was blind and free of pain. I recommended its removal. This was done by Mr. T. S. Ellis, of Gloucester, by whose courtesy I am enabled to publish the case, and who kindly sent me the eye for examination. I am also much obliged to Dr. Rayner Batten, who saw the boy in consultation with Mr. Ellis on October 2nd, for putting his notes then taken at my disposal.

From these sources, and from the friends who brought the boy, I obtained the following history:

The patient was in his usual health up to Monday, September 27th, 1897, when his eye was bloodshot. Next day it was inflamed and very painful, and he felt ill. On Wednesday he became delirious; his temperature reached 105°, and continued high at nights and lower in the morning for several days. On Thursday he was vomiting;

there was restlessness and delirium, great pain in the right arm (particularly in the elbow) and in the leg. The glands of the neck were slightly swollen, and petechiæ came out on the body.

On Saturday Dr. Batten found him covered with purpuric spots, some of which were beginning to fade; no fresh ones appeared to have developed after the first onset. There were marked retraction of the head, and pains in the neck on each side. The temperature was then 100°, and the pulse quickened, but the patient was evidently better than he had been. Vomiting had ceased; he had slept; the bowels had acted properly; there was no melæna or hæmaturia, nor any evidence of external hæmorrhages. Nothing could be detected wrong either with the heart or lungs. The urine was normal and free from blood, albumen, and sugar. The left eye was bloodshot, the pupil contracted, and the sight of the eye only that of discernment of large objects. The boy was too ill to allow of ophthalmoscopic examination, and at a later date the occluded pupil prevented the eye fundus being seen.

On the seventh day of the illness (Sunday) there was profuse nose-bleeding, and after it decided improvement in the general condition of the patient. Delirium ceased and the sickness lessened. The temperature remained high for another week. The elbow and shoulder joints remained painful and swollen till the end of the third week, after which time the boy got well excepting for his eye. This continued very painful and bloodshot, but gradually quieted down, and for a while he could count fingers with it. After a short time it became blind, but gave rise to no discomfort until a few months before I saw him.

The case was diagnosed as one of sporadic cerebro-spinal meningitis.

Dr. Batten says:—"The suddenness of onset, the head and neck symptoms, the fever, the eye symptoms, threatening destruction of that organ, and the purpuric spots, all

bear out the view that the case was one of cerebro-spinal meningitis."

Mr. Ellis also writes:—"There cannot be any doubt whatever that this case was one of those described as epidemic meningitis. The descriptions given in the books are perfectly true of it; but I am quite sure that no case at all like this has occurred in any of the boy's connections or surroundings before or since. The family history is a fairly good one, though neither of the parents are very strong. The boy has always had good health, and has a happy, healthy home on the north-west slope of one of the outlying Cotswold Hills."

Dr. R. J. Coulter hardened the eyeball in formol, froze, and bisected it.

I now show the lower half mounted in glycerine jelly.

The anterior chamber is almost absent, and the pupil is completely adherent to a cataractous lens. The posterior aqueous chamber is much distended; the iris is thinned, and widely separated from the lens, but closely pressed against the cornea.

The retina is completely detached and adherent to the back of the lens, where a rounded body as large as a pea proves to consist of degenerated retina in a homogeneous matrix, in which no trace of pus cells can be found.

The choroid is very much thinned and wanting in pigment. The space between it and the retina was filled with structureless coagulated exudation, while towards the ciliary portion in the lower half of the eyeball was a white, hardened layer, suggestive of ossifying choroid, which consisted mainly of large cells.

If we except the cells just mentioned there was no trace of suppuration to be seen, nor was the history of the attack suggestive of it.

The same morbid process which caused the delirium, the retraction of the head, and the purpura appears to have started an intra-ocular inflammation, which culminated in gradual destruction of the sight, with degeneration of the eyeball. (*March 8th*, 1900.)

Mr. Nettleship said he did not remember seeing a case like the one mentioned by Mr. Silcock, but he had from time to time seen cases like the one mentioned by Mr. Cross. One was in a little girl ill of influenza, but in whom there were symptoms pointing to spinal meningitis. In that case the patient got well, and the eye partially recovered, but with much opacity in the vitreous. In another case, published in vol. v of the Society's 'Transactions,' the patient was a little girl of 2½ years, whose illness began with some ill-defined pain in one of the limbs, swelling of certain joints, acute irido-cyclitis of one eye with some lymph in the chamber, which quickly disappeared, the eye degenerating, and a variable, but not very high, temperature. No very positive diagnosis was made, except that it was thought she had meningitis. The patient lived for six or eight weeks. Examination proved that she had severe cerebro-spinal meningitis, due to the disease of the middle ear, which had not been found out. The changes in the eye were similar to those in Mr. Cross's case. He called attention to two features of the eye inflammation in cases of this septic irido-cyclitis. If the eye was seen quite early in the attack, when the iritis first began, there was a good deal of lymph in the chamber, not in the form of pus, but apparently coagulated, and as if smeared in patches over the iris. Secondly, although the production of lymph in the vitreous usually increased and virtually destroyed the eye, the lymph in the anterior chamber disappeared in two or three days, and did not recur. He had seen that happen in several cases.

Mr. Treacher Collins said he had published in the Royal London Ophthalmic 'Reports,' vol. xiii, a case very like the last one mentioned by Mr. Nettleship. It was that of a child who had acute irido-cyclitis, with much yellow exudation into the vitreous, which led to glioma of the retina being suspected and excision of the eye. The child had for some days been very ill, and later became much worse, developing symptoms of meningitis. On

examination middle ear disease was discovered. The child ultimately died. At the post-mortem examination much yellow lymph was found on the meninges, and microscopically he had been able to trace inflammatory exudation down the optic nerve to the stump which had been left in the orbit. Apparently in this case the ear disease had given rise to the meningitis, and inflammation had spread down the optic nerve to the eyeball.

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10. *Ophthalmitis associated with basal meningitis.*

By Sydney Stephenson.

B. A—, æt. 7 months, admitted to the North-Eastern Hospital for Children on February 20th, 1900, under the care of Dr. James Taylor.

History.—On February 15th the child was seized with convulsions (thought by his mother to be brought on by teething), which continued off and on up to admission to the hospital. He had been noticed to put his hand frequently to the left side of his head, but there had been no vomiting, diarrhœa, or discharge from the ears. The patient, born at term, was stated to have been well up to the time of the present attack. His brothers and sisters, four in number, said to be healthy. His mother has had no miscarriages.

State on admission.—A sallow, ill-nourished baby, with loose and flabby skin, and purpuric spots on face, arms, chest, abdomen, and legs. The superficial veins in the anterior and posterior regions of the scalp are unduly prominent; the anterior fontanelle is distended. No teeth have been "cut." The ribs are beaded, and the epiphyses of the wrists and ankles are thickened; the elbow-joints are enlarged, particularly the left one.

There is slight rigidity of the muscles of the neck and a tendency towards retraction of the head. No stiffness of the lower limbs in any posture. Examination of heart, lungs, and abdomen negative. Tongue moist and clean. Urine free from albumen. Motions yellow and rather offensive. No discharge from either ear; tympanic membranes normal. Temperature, 102·8° F.; pulse, 132; respirations, 36. Right eye—pupil responds to light; no change in media or fundus. Left eye—slight watery discharge and irregular ciliary congestion. No corneal ulceration. Anterior chamber two thirds filled with a greyish-white, flocculent exudation, not resembling ordinary pus. Pupil small. No fundus reflex. Tension low.

Progress.—During the following week, the temperature ranged from 99° F. to 102·8° F.; the pulse from 120 to 152, and the respirations from 32 to 52; the bowels acted two to four times a day. On February 28th—that is, eight days after admission—the general condition was not materially changed. The baby then weighed 11 pounds. The right eye showed neither optic neuritis nor other appreciable alteration. As to the left eye, the exudation formerly present in the anterior chamber had been absorbed, and through the somewhat hazy cornea the pupil could be seen to be closed by synechiæ. The eyeball appeared rather shrunken; tension was *minus*.

From this time onward the temperature fluctuated considerably, the baby became thinner and grew steadily worse, and death in coma eventually took place on March 20th, twenty-eight days after admission to hospital and thirty-three days after beginning of the illness.

Autopsy.—The examination was made about twelve hours after death. Rigor mortis and post-mortem staining were noted. The wasted cadaver showed marked beading of the ribs. Right eye normal; left eye shrunken. Pleuræ, lungs, larynx, heart, pericardium, abdomen, spleen, liver, kidneys, and alimentary canal showed no naked-eye changes. The vertex of the brain

was of normal appearance. A mass of gelatinous lympho-pus lay on the surface of the medulla and covered adjacent parts, while flakes of lymph were present on the cerebellum, and could be traced along the crura to the left optic nerve. The ventricles, which were of natural dimensions, contained clear fluid. Tubercle, although carefully looked for, could not be found. The middle ears were normal; the membrana tympani were intact. The upper part of the spinal cord manifested no obvious changes. The eyes, together with the optic nerves and chiasma, were removed for further examination.

The lympho-pus from the base of the brain was smeared over the surface of cover-glasses and inoculated into tubes of agar-agar and blood-serum. The cover-glass preparations were stained in several ways. They included bacilli and cocci. The latter were mainly lodged within the protoplasm of the cells, and their likeness to gonococci was heightened by the fact that they did not stain by Gram's method. After twenty-four hours at 37·5° C., all the inoculated tubes contained colonies. The agar media were found to include—(1) *Staphylococcus pyogenes albus,* (2) *Staphylococcus pyogenes aureus,* (3) a short bacillus staining by Gram, and (4) a small diplococcus not staining by Gram. The serum tubes contained No. 4 only.* Pure subcultures were obtained of these various micro-organisms. With respect to the pus-cocci nothing need be said, but a few words of description appear to be called for as regards the other microbes. The short bacillus (3) stained with basic aniline dyes and also by Gram's method. It was of fair size, and although it often had a nodular outline, yet it showed no evidence of spore formation. It did not liquefy gelatine. Its colonies on agar were semi-transparent and opalescent, but its growth on that medium was not luxuriant. It could not be identified. The small coccus (4) at incubation temperature formed

* A colony of *Staphylococcus pyogenes citreus* appeared in one of the serum tubes at a much later period.

upon agar grey translucent colonies, of a stringy, tenacious consistence. On blood-serum the growth was less abundant. It did not develop on gelatine (17°—21° C.). The organism occurred so often in pairs as to entitle it to be termed a diplococcus. It varied in size from 0·7 μ to 1·5 μ. It was difficult to stain with any of the reagents tried. It did not take Gram, the loss of colour with alcohol being almost instantaneous. Attempts at reproduction failed entirely after the lapse of a month. The micro-organism corresponded closely with the description given of the meningococcus of Weichselbaum, now known to be the cause of cerebro-spinal meningitis.*

It should be explained that the bacteriological specimens were obtained about twelve hours after death, without special precautions, so that the pyococci and the unidentified bacillus may well have been of extraneous origin.

Examination of the eyes, etc.—The eyes were hardened in 10 per cent. formalin, frozen, and bisected. The right (unaffected) eye measured 20 mm. by 21 mm. Both to naked-eye and to microscopical examination it appeared normal. It may be noted, however, as a point of some little interest, that the regular edge of the ora serrata was broken at one place by a flask-shaped lighter spot (1·25 mm. by 1 mm.), extending into the retina proper. The left (affected) eye was shrunken, and measured 15 mm. by 19·5 mm. The cornea, though wrinkled, appeared to be normal. The anterior chamber was reduced to narrow dimensions, and the root of the iris was retracted. The iris—convex anteriorly—was applied closely to the crystalline lens, a structure that itself had undergone alteration in shape. The choroid, ciliary body, and optic nerve were thickened. The vitreous chamber was filled by an opaque mass, consisting of

* A pure culture was sent to the West-End Pathological Laboratory. A report stated that over half a c.c. of thick emulsion injected beneath the skin of a guinea-pig produced nothing beyond the usual transitory swelling.

two portions :—first, a yellowish-white deposit occupying, perhaps, two thirds of the cavity; secondly, a deposit of darker colour, lying behind that just named. These two masses were separated by degenerated retina.

Microscopical examination.—The deeper cells of the anterior corneal epithelium are swollen and globular. Bowman's layer is wrinkled, presumably because the globe, as a whole, is shrunken. The corneal lamellæ are spaced out. Descemet's elastic membrane can be recognised. The posterior corneal endothelium has undergone hyperplastic changes. The vessels of the sclera are distended, while the fibrous tissue contains nuclei. The anterior chamber (the angle of which is open) is of unequal depth. It includes here and there collections of round, nucleated cells, along with pigmented cells and particles. The iris vessels are distended, and its stroma infiltrated with inflammatory cells: its two layers of uveal pigment are in places widely separated from one another, and the hindermost is adherent to the capsule of the crystalline lens. The pupil is closed by a thin layer, made up of round, spindle, and pigmented cells. The lens is deformed, its capsule is intact, its anterior epithelium can be recognised. The ciliary muscle is infiltrated with inflammatory and pigmented cells. The ciliary processes form pigmented and non-pigmented tubular extensions into an exudation, which encloses the lens behind and laterally. The exudation in question is composed of a network of fibres, blood-vessels, round- and spindle-cells, free pigmentary cells, and pigment particles. The choroid is markedly thickened; its layers are spaced-out, extensively infiltrated with deeply stained cells, and its blood-vessels are distended. The detached and degenerated retina is folded, much thickened, and its layers can often be identified only with difficulty. The pigmented epithelium has undergone hyperplasia. The retina is separated from the choroid by inflammatory exudation. The cavity of the vitreous is filled with an exudation of

lymph, including small round-cells, together with peculiar large, granular elements, having one or more nuclei. The optic papilla is œdematous, and there is interstitial neuritis of the portion of nerve left attached to the eyeball. Sections of the nerve behind the globe show also interstitial neuritis. In the chiasma there is perivasculitis, and in the pia mater small-cell infiltration.

Remarks.—It can scarcely be doubted that the patient suffered from posterior basic meningitis, an affection not altogether uncommon in children under two years of age. The discovery of Weichselbaum's meningococcus in the exudation at the base of the brain seemed at first to stamp the ailment as an instance of sporadic cerebro-spinal meningitis. As I have since learnt, however, a very similar micro-organism has been described by Dr. G. F. Still * as present in a series of cases of posterior basic meningitis. The differential diagnosis between the organisms—that of Weichselbaum and that of Still—is not very definite. They differ, in fact, in three main respects merely:—(1) The coccus of basic meningitis may, upon suitable media, survive thirty days or even longer, whereas the meningococcus is stated to die out within a few days; (2) the microbe of basic meningitis grows well in broth; and (3) when injected beneath the skin of animals its virulence seems to be slight. So close is the resemblance between the two micro-organisms that Dr. Still inclines to regard his coccus as the meningococcus altered by "natural variation." In my case the other forms of meningitis were excluded, both during life by the symptoms, and after death by the absence of tubercle, disease of ear or nose, or infective foci, such as might be furnished by endocarditis, pneumonia, or empyema.

That meningitis may be associated with ophthalmitis has been widely recognised since the publication in 1882 of Mr. Nettleship's paper on "Certain Cases of Destructive Ophthalmitis simulating Glioma in Children." †

* Still, 'Journal of Pathology and Bacteriology,' May, 1898.

† Nettleship, 'Trans. Ophth. Soc.,' vol. iii.

In that communication, it will be remembered, the author brought forward and analysed twenty-seven cases,—seventeen of his own, and ten that he had collected elsewhere. In seven of the seventeen original cases the eye mischief was preceded by cerebral symptoms. Mr. H. Lewis Jones, in the fourth volume of the Society's 'Transactions,' communicated the clinical details of a case somewhat resembling mine. A child, aged one year and nine months, developed cerebral signs shortly after an accident. On the sixth day of the illness iritis and hypopyon were found in one eye, and this was soon followed by the changes often spoken of collectively as "pseudo-glioma." Optic neuritis was present in the other eye. Unfortunately the report is incomplete. In the fifth volume of the 'Transactions' Mr. Nettleship records an instructive case where a child, two and a half years of age, developed purulent irido-cyclitis in one eye, and optic neuritis in the other. The symptoms were indefinite, so that a diagnosis was not made until meningitis, believed to have originated from purulent disease of the middle ear, was found upon the post-mortem table. Mr. Treacher Collins in 1892 (*Royal London Ophthalmic Hospital Reports*, vol. xiii, part 3) brought forward a series of eleven cases of "pseudo-glioma," in six of which cerebral symptoms had been noted. He pointed out as the outcome of his pathological investigations, that in many of his cases there was papillitis or inflammation in the ocular part of the optic nerve. He concluded that inflammation began in the retina, and speedily spread to the pars ciliaris retinæ, ciliary body, and iris. In one of his cases (No. 13) he found papillitis and inflammation of the ocular end of the optic nerve, chiasma, and membranes. In his view the appearance suggested direct extension of inflammation from the inflamed meninges to the eye along the optic nerve. Mr. Cargill, in the eighteenth volume of the 'Transactions,' records the case of an infant of five months, who developed "pseudo-glioma" in the course of a fatal meningitis set up by

middle-ear disease. The child survived about ten months. There was no post-mortem examination.

The essential pathological changes in my case were neuro-retinitis and diffuse uveitis. Definite inflammatory changes could be demonstrated in the chiasma, and along the optic nerve, and in the papilla of the affected eye. Accordingly, there seems no reason to doubt that the eye mischief was consecutive to, and dependent upon, the meningeal changes. The inflammation, as in Mr. Collins' case, seems to have passed along the optic nerve to the eyeball, probably by the perivascular lymph-sheaths. The chain of proof would be strengthened if meningococci could have been demonstrated within the eyeball, although one need not attach undue importance to a failure in that direction. The large coarsely granular cells in the vitreous chamber are like the cells found in the exudation at the base of the brain, and one would expect to find organisms in them if nowhere else. I regret to say, however, that my efforts to do so proved indefinite, if not actually futile. The early hypopyon, if examined, might have been found to consist of similar cells, containing the characteristic meningococci. If an investigation of that kind were made in doubtful cases diagnosis might be facilitated.

In conclusion, I have to thank Dr. James Taylor for permission to publish the case, and Mr. John Griffith for his kindness in comparing my pathological specimens with my description of the appearances.

N.B.—The case was illustrated by specimens, macroscopical and microscopical. (*June 14th*, 1900.)

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11. *Pseudo-glioma.*

By E. W. Brewerton.

The lower half of the right eye, removed from a child æt. 20 months.

History.—Only child, born prematurely at eight

months. Measles, whooping-cough, and broncho-pneumonia one year ago. Fits followed by unconsciousness one month before admission. Right eye inflamed one week later, with hazy pupil, followed soon after by yellowish reflection from the pupil.

Condition on admission.—Right eye: Conjunctival and scleral vessels dilated. Cornea clear. Anterior chamber obliterated. Pupil partially dilated, and iris bound down to anterior capsule of lens. Lens clear. Yellowish white reflection from growth immediately behind the lens. Tension slightly diminished.

On division of specimen.—The ciliary processes are dragged inwards by the growth. The retina is completely detached and was separated from the choroid by a semi-solid exudation, which has been removed. Below is a considerable effusion of blood.

The anterior part of the growth in contact with the back of the lens consists of cicatricial tissue; behind this is a layer of loose areolar tissue (probably the remains of the vitreous), with folds of the detached retina extending into it. These folds are in places dilated into large cystic cavities.

The ciliary processes are dragged inwards by the growth and show much round-celled infiltration and extravasations of blood. Multiplication of the pigment cells with much derangement of pigment has occurred.

Section of optic nerve.—The lumen of the arteria centralis is much encroached upon by inflammatory thickening of the subendothelial tissue.

(*Card specimen. July 6th,* 1900.)

Mr. C. D. Marshall asked Mr. Brewerton if in his case there was a history of fits. It frequently happened that pseudo-glioma was associated with basal meningitis and probably caused by the inflammation travelling forwards and affecting the eye. This condition of things had been called attention to by Mr. Collins and other observers.

Mr. W. H. H. Jessop thought the case was most interesting. There was endarteritis in the central retinal artery. He would like to ask how soon there could be a cystoid degeneration of the retina, how soon the retina would be thrown into such folds, and whether they were dealing with a fœtal condition or whether with an inflammation two or three months old.

12. *Three cases of ophthalmitis; pseudo-glioma in children; one recovery, two fatal from meningitis.*

By Percy Flemming.

Case 1.—Annie J—, æt. 7 months, was admitted to University College Hospital, April 20th, 1899. The child was sent to my out-patient department the previous day for a report on the eye condition, the diagnosis being meningitis. I found the right eye injected, the iris a little muddy, pupil small; no hypopyon, but an appearance of fibrinous exudation on the iris. The pupil readily dilated with atropine, and then a distinct yellowish reflex was obtained from the lower part of the vitreous on ophthalmoscopic examination. The tension of the eye seemed normal. There was no optic neuritis in either eye. The left was normal in every respect.

On inquiry the mother told us that the child had had a discharge from the left ear for two or three weeks, and that the head had been drawn back one week. Further, the child had been "feverish" and fretful, had had one or two convulsions, and now had diarrhœa. There was no history of any acute specific fever, no history or sign of congenital syphilis, and a very slight tubercular history.

On admission the general symptoms were head retraction, vomiting, drowsiness, and irritability, with irregular pyrexia.

Up to June 13th the symptoms seemed to vary with the temperature; thus the latter would keep about normal for some days, and then the child would be bright and take its food well. Then the temperature would rapidly rise up to 104°, the child become unconscious, with return of vomiting, and the head retraction.

The exudation into the vitreous of the right eye increased, came close up to the posterior part of the lens, which seemed pushed forward by it, and at the same time the periphery of the iris became retracted. The eye began to shrink, and the tension became minus.

The general condition slowly improved. The child left the hospital in July, 1899, well. I saw her again in November; the eye was still small, and the lens had become opaque. The general health was good.

At no time was any swelling of the joints detected, though carefully looked for; nor was the left eye in any way affected. The tympanic membranes were said to be normal in appearance.

The physician under whose care the case was regarded it as one of simple meningitis.

Case 2.—Child æt. 6 months. Was admitted to University College Hospital in February of this year. There was a history of head retraction, vomiting, occasional squint, and feverishness, and the case was sent in by a medical man who considered it to be one of meningitis. No history of injury, and nothing of importance in the family history. The left eye was injected; there was a white mass in the front part of the vitreous, pushing the lens forward and shallowing the anterior chamber; the pupil rather dilated; no synechiæ, and no definite retraction of iris base; tension doubtful. I removed the eye, as I considered the mass in the vitreous might be glioma, and the doubts I had then as to its nature have

only been set at rest by careful microscopic investigation since.

The child was distinctly better a few days after the enucleation, but then developed chicken-pox, which ran its usual course.

The note on March 29th is :—"Vomiting is, and has been for some days, almost persistent; there is marked head retraction. No joint swelling. No ear discharge. The ears were examined and said to be normal, and the right membrana tympani was incised with negative results.

There was no optic neuritis or choroiditis in the right eye. The vomiting continued, and the child died, much wasted, on April 19th.

Post-mortem examination showed typical posterior basic meningitis. The membranes at the base were matted together by fibrous exudation, the mass extending from around the fourth ventricle, over the pons and crura, to the optic commissure; the ventricles were enormously distended, and the convolutions flattened. The right middle ear was normal, but the left contained a quantity of pus. The other organs were normal. No trace of tubercle anywhere.

Examination of eye showed complete detachment of retina, the vitreous cavity completely filled with a pinkish-white mass extending up to the lens, the posterior pole of which projected backwards in a knob-like manner; periphery of iris retracted. Microscopical examination showed the white mass to consist of small round cells; many of the cells show nuclear division, and in places there are large nucleated cells, with clear protoplasmic contents. Mr. Treacher Collins was good enough to examine the sections, and reports that he considers the appearances are due to inflammation. Sections of the stump of the left optic nerve removed post mortem showed distinct excess of nuclei in the pial sheath and in the trabeculæ, and marked hyperæmia in the tissues outside the nerve and its sheaths; the hyper-nucleation was

not more marked in the proximal than the distal end of the stump. Sections of the *right* optic nerve showed similar changes in the sheath and trabeculæ, if anything the changes being rather more marked than in the other nerve. There was no papillitis in the right eye on microscopical examination.

Dr. Nabarro, Assistant in the Pathological Laboratory at University College, examined the fluid contained in the ventricles, and also the basal lymph for micro-organisms, and reports as follows:

Preliminary Report of Bacteriological Investigation on case of Pseudo-glioma and Meningitis.

I. *Fluid in third ventricle.*—A broth culture showed a mixed growth containing:

1. *Staphylococcus aureus* and probably *albus*.
2. *Steptococci.*
3. *Diplococci* (greatly predominating and at first thought to be the specific coccus of posterior basic meningitis. It stains by Gram, and from its cultural characteristics it is probably only a variety of staphylococcus).
4. *Bacilli* (staining by Gram).

II. *Basal lymph*—inoculated into broth, showed the same varieties of cocci and bacilli as before (I).

This broth (after nineteen days' incubation) killed a mouse in forty hours. The mouse died from a mixed infection (septicæmia); and from its heart-blood and spleen, single, diplo- and staphylococci were obtained in fibres and in subcultures. A small dose (1½ c.c.) inoculated into a guinea-pig had no effect, but a larger dose (3 c.c.) caused necrosis or an abscess at seat of inoculation, from which the same mixture of organisms was obtained.

Case 3.—Child æt. 18 months, was admitted in July,

1899, with a history of convulsions, squint, abdominal pain, and later on unconsciousness.

On admission the note is, "Drowsy, not unconscious, no head retraction; temperature 103° to 104°; herpes on lips and tongue; some rigidity of back and legs, but no retraction of head."

On July 18th the temperature varied from 99° to 105°, but no vomiting.

On August 12th.—Right eye was noticed to be inflamed, there was iritis, and the pupil looked grey. A few days later the eye looked more inflamed and there was a mass in the vitreous preventing any view of the fundus. Tension *minus*.

The temperature would be raised for a few days, then fall to normal and remain so for a day or two. The pyrexia later was associated with vomiting. The child died September 19th, 1899.

Post-mortem showed pneumonia of a low form with some collapse of lung. The dura mater was more adherent to skull and brain than usual; the ventricles much dilated and distended, with consequent flattening of convolutions. The membranes at the base were adherent, and pia mater much thickened around circle of Willis and roof of fourth ventricle. Middle ears normal. No tubercle anywhere.

The eye removed post mortem showed a complete detachment of the retina, with a mass of exudation filling up the vitreous cavity and extending to back of lens and ciliary body. A section of the proximal end of the nerve 4 mm. behind the globe showed distinct but slight increase of nuclei in the nerve-sheath and along the trabeculæ. No hyperæmia.

The non-fatal termination of the majority of cases of ophthalmitis in children, seems to be one of the characteristics of the condition; indeed the writer of the article in Norris' and Oliver's 'Systems,' says that death never takes place. Adding together the cases published

by Mr. Nettleship in the 'Transactions' of this Society; in the 'Roy. Lond. Ophth. Hosp. Reports,' by Mr. Treacher Collins; and the three in this paper, we have forty-two cases and six deaths. In these six fatal cases meningitis was found in five; in one of these the meningitis was old, in four recent, and of these four, three were associated with pus in the middle ear. There are no post-mortem notes of the sixth fatal case.

It is tempting to assume from these post-mortem records that meningitis is the cause of the ophthalmitis, and further that the meningitis is due to otitis media; and the clinical history seems to support this, as does also the occurrence of ophthalmitis in epidemic cerebro-spinal meningitis. But a further study of these cases renders, I think, this view improbable. In the first place it is obvious that death is an exceptional feature, so that *a priori* one, would expect to find post mortem an exceptional condition present,—a condition responsible for the fatal ending of the case. Secondly, in the article by Drs. Barlow and Lees, in 'Allbutt's System,' founded on 110 cases of posterior basic meningitis, it is stated that pseudo-glioma was only met with once; and to these may be added eleven cases of the same condition recorded by Dr. Carr, with no case of ophthalmitis. Further, in these cases of posterior basic meningitis, optic neuritis occurs quite exceptionally; Barlow and Lees found it three times in forty-two cases. Thirdly, the condition is more often unilateral, and though optic neuritis has been observed in the unaffected eye in a few of the unilateral cases, it is not at all constant, and was not found in two of the three cases forming the subject of this paper; and one would expect both eyes to be affected if the cause were a local meningitis. Fourthly, it is difficult to see why meningitis should in these cases cause a uveitis, and not as in tubercular and other cases of meningitis, a papillitis. Fifthly, if meningitis be the usual cause, it seems remarkable that the prognosis, as to life, is so good. But

it is right to mention that Ashby and Wright, in their book on 'Diseases of Children,' do state that cases of posterior basic meningitis recover, and in the discussion on Dr. Carr's paper, at the Royal Medical and Chirurgical Society, Dr. Church took a rather more hopeful view of the prognosis of cases of posterior basic meningitis, than did the author of the paper.

These seem to me to be real difficulties in the way of accepting meningitis as the usual cause of the ophthalmitis. Rather, I should regard the meningitis and ophthalmitis each as the result of a pyæmic or septicæmic process. In the majority of cases the pyæmic process is limited to the eye, and the child recovers; in other cases the pyæmic process involves the brain as well—meningitis ensues, and leads to a fatal end; and apart altogether from the question of ophthalmitis, purulent meningitis is known to develop in the course of septicæmia. In this connection it is, I think, worth while referring to two cases, as showing how pyæmia may be mistaken for meningitis. One put on record by Hilton Fagge, in which he says he expected to find acute tubercular meningitis post mortem, which turned out to be a case of pyæmia; the other a case of burn which occurred at University College Hospital, in which symptoms resembling meningitis developed, and on post-mortem examination the brain was found quite healthy and several of the joints contained pus.

The pyæmic origin of these cases of ophthalmitis in children brings them into line with those cases of ophthalmitis that occur in puerperal pyæmia, in which micrococcal plugging of the retinal and choroidal veins has been demonstrated. And ophthalmitis has been noted in connection with umbilical pyæmia in infants. The middle ear suppuration seems a likely source of the pyæmic process in some of these cases, and it is possible that this may be the connecting link between the acute specific fevers and pseudo-glioma, otitis media being so common a complication of the former.

Whichever view one accepts, it seems very important to examine the ears in all cases of ophthalmitis and to puncture *both* membranes, even if they appear healthy, —a point that Mr. Ballance has insisted on. It is interesting to note, that of the three cases forming the subject of this paper, recovery took place in the one in which the membrana tympani perforated spontaneously, resulting in a discharge from the ear.

Note.—Mr. Stephenson's fatal case reported at the previous meeting should be added to those given in the paper.

Case 3 came into my hands as a post-mortem specimen, and I am indebted to a medical friend for the notes.

(*July 6th*, 1900.)

VI. INTRA-OCULAR TUMOURS.

1. *Intra-ocular growth, right eye.*

By H. Work Dodd.

V. R. counts fingers at 1 m. L. $\frac{6}{9}$.

A woman, æt. 52, shows a large, globular, semi-opaque protuberance in the right upper quadrant. The surface of the growth gives a red reflex, is fairly regular, not undulating. When the eye is moved there is no swaying visible, and there are vessels more or less straightened to be seen. Tension normal. The right pupil has no direct action to light.

In July last she first noticed loss of sight gradually coming on. There is no history of injury.

(*Card specimen. November 9th,* 1899.)

Mr. Adams Frost said he thought the case was probably cystic, because it was so very globular and so very unlike any solid growth he had seen previously in the fundus. Those which he had seen had been of a darker colour than the present one, which had a very translucent appearance. He quite saw the point, that if there were choroidal vessels on it, it could hardly be a cyst of the retina. There was one large vessel which might be choroidal. He thought it would be important to throw light obliquely through the growth, and also put a trochar into it to see if anything came out.

Mr. Doyne said he had seen a case very like the present one. He thought the vessels which could be seen were those of the new growth. The red reflex also, he thought, was from the growth, not from the choroid.

2. *Macroscopic and microscopic specimens of Mr. Work Dodd's case of retinal detachment, shown at the last meeting.*

By John Griffith.

The eyeball, hardened in formol, was divided through its horizontal meridian. In the upper half a white growth is seen. The section passed through the summit of the tumour, as it projected downwards from the roof of the vitreous cavity. The slice of the growth shaved off was too small for examination, and so a larger piece was removed, which accounts for its shrunken appearance in the jelly preparation. The retina was detached over a greater area than that corresponding to the tumour, as is usual in these cases. The extravasation of blood which surrounds the growth is the result of an exploratory puncture prior to excision. The diameter of the cut surface is 6 mm. From base to apex the length was probably 10 mm. to 12 mm.

Microscopically it is a fasciculated spindle-celled sarcoma, the bundles of which, being cut transversely, cause it to present an alveolar appearance. It is devoid of pigmentation. Blood-vessels with sarcomatous walls are plentiful. (*Card specimen. December 14th,* 1899.)

The Chairman (Mr. A. Q. Silcock) said that in two cases of the kind he had explored the tumour by means of a needle. Passing a needle through the sclera behind the ciliary region and observing its point with the ophthalmoscope, he had punctured the detachment, thereby hoping to make a diagnosis. In neither of the cases in which he resorted to it was there a growth; he judged that to be the case by the fact that no blood came away through the retinal incision, as probably it would have done if there had been one. In neither case had he therefore excised, and the subsequent history of the cases had justified the course he took.

3. *Pigmented tumour of the eyeball; death from multiple pigmented carcinomata nearly fourteen years after excision of the eye.*

By J. Herbert Fisher and Charles R. Box, M.D.

As long ago as 1857 Müller described the epithelial character of the cells of the pars ciliaris retinæ, whilst Schwalbe, in 1874, noted their resemblance to glandular epithelium, an opinion which was subsequently confirmed by Boucheron and Nicati. The distinct advance achieved by Mr. Treacher Collins, by the aid of his discovery of the possibility of bleaching these glandular cells, will be familiar to the members of this Society. His valuable work is recorded in vol. ix of the 'Transactions;' here Mr. Collins describes his discovery of definite pigmented glands in the ciliary body, their situation and probable function, and alludes to their pathological condition in "serous iritis" and "plastic cyclitis." Alt, in his 'Lectures on the Human Eye' (p. 123), describes a tumour-like formation in the ciliary body, which Mr. Collins regards as an adenoma. Of the ciliary body tumours available for examination in the Moorfields Museum, re-examination proved two to be of epithelial type, and they should, in Mr. Collins' opinion, be classed as glandular melanotic carcinomata. To these two may be added Mr. Rockliffe's case, recorded in vol. xiv of this Society's 'Transactions,' a case by Michel, and another by Badal and Lagrange, all of which appear to be cases of primary malignant intra-ocular growth of epithelial or glandular type. Our President's case of pigmented epithelial tumour, pathologically reported on by Mr. John Griffiths, is recorded in vol. xiv of the 'Transactions.' Mr. Griffiths considered it to have originated in the hexagonal pigment layer of the retina, behind the site in which Mr. Collins' glands are located. Mr. Snell's case is in vol. xix; a patho-

logical committee was not sure that the ocular growth was a primary one. Buchanan, who examined the specimen from a case described by Robertson in the 'Ophthalmic Review,' was quite definite that the growth was epithelial, but inclined to think that it originated in the iris and extended into the ciliary region. The case which Gayet published in 1889, as adenoma of the choroid, he considered to be a secondary growth, and Mr. Lawford, in his paper before the British Medical Association in 1892, took exception to this title.

In spite of this mass of evidence, in Norris and Oliver we find it stated that a case of primary intra-ocular carcinoma has yet to be described. Whether the case which we bring before the Society this evening meets the requirements or not, it is evident that every case bearing on the subject should be recorded. If our case be admitted as such, it will, as far as we can find, be the first in which a fatal result followed from secondary growths, when the primary growth was an intra-ocular pigmented carcinoma, and a post-mortem examination made the record complete. We are aware that the President's case was attended by a fatal result with local recurrence in the orbit, but although disseminated growths were suspected, no autopsy was allowed.

We come before the Society this evening in the *rôle* of compilers, and desire to express our thanks to Mr. Nettleship, under whose care the patient originally was, and to Dr. Sharkey, in whose ward the patient died, for permission to publish the case.

H. W—, æt. 42, was admitted to the Ophthalmic Ward, St. Thomas's Hospital, under care of Mr. Nettleship, on October 8th, 1885.

His family history had no bearing on the case. Some years previously he had been an out-patient at Moorfields Hospital, under Mr. Lawson, with both eyes bad; six months previous to this he had suffered from gonorrhæa, but had never, so far as he knew, had syphilis.

He had first noticed a swelling over the sclerotic of the

right eye two years before admission to St. Thomas's. The swelling gradually increased.

On admission under Mr. Nettleship's care the right eye showed a lobulated, fleshy mass, down and in, on the ciliary region of the sclerotic, and a brownish-pink rounded mass was noted behind the lower part of the iris, the latter being pressed forwards.

The affected eye read 6 J. and made out words of even 1 J.; counted fingers at 3 metres, and read $\frac{6}{60}$ with -3 D. The tension was + 1.

The vision of the left eye was $\frac{6}{36}$, improved by -4 D. to $\frac{6}{18}$. Myopic crescents were present in each eye.

On October 9th, 1885, the right eye was excised. A week later the contents of the right orbit were removed down to the bone. The amount of bleeding from the ophthalmic artery was unusual, and was checked by solid perchloride of iron at the apex of the orbit, whilst the orbit was also lined with chloride of zinc paste. At the end of the operation a small communication with the nose was observed.

The after progress of the case was uneventful, and the patient left the hospital one month after the exenteration of the orbit.

At the time the ocular growth was regarded as a melanotic sarcoma. No microscopical examination is recorded, but the growth was preserved.

On July 6th, 1899, the patient was readmitted to St. Thomas' Hospital, under Dr. Sharkey, being now fifty-six years of age. His complaint was loss of weight and weakness. For the past fifteen months he had noticed a swelling in his abdomen, but only gave up work six weeks before admission. The last few weeks the mass had increased rapidly, and he experienced much pain in the chest, abdomen, and legs. For a month the legs had been swollen, and he had quite lately become jaundiced. He frequently vomited. Moderate indulgence in alcohol.

On examination, it was found that the abdomen was

rendered prominent by the presence of a large and hard tumour in the region of the liver; the mass extended below the umbilicus, filling up the epigastrium and the right hypochondrium. The percussion note over it was dull. The measurement from the upper limit of the dull area to the edge of the tumour in the nipple line was fourteen inches. The surface felt hard and irregular, and in addition a rounded swelling projected from it in the epigastrium and another in the right hypochondrium. The spleen was not enlarged, and no other masses could be felt in the abdomen.

No growth could be felt *per rectum*.

There was no evidence of any lung disease.

The cardiac area and cardiac sounds were normal. The arteries were somewhat thickened.

The skin was distinctly jaundiced, and the legs were œdematous. The urine, which was scanty, contained half albumen and bile. Its colour did not become darker on exposure.

The patient, who was much troubled by abdominal pain, diarrhœa, and flatulence, lingered until July 13th. The temperature rose to 105° F. just before death.

A post-mortem examination of the body was made twenty-six hours after death. The right eye had been entirely removed and there was no recurrence locally. The left eye was removed and opened; no growths were found in it. The tongue, fauces, œsophagus, and upper air-passages were normal in appearance. The apex of the right pleural sac and the base of the left were partially obliterated by old adhesions.

The upper lobe of the right lung was much scarred by old tuberculosis, the deposit having extended from just below the extreme apex along the posterior border. There was no evidence of any active or recent infection. Both right and left lungs were highly œdematous. No growths were present in them. A few melanotic nodules were found in the parietal pleura of the left side.

The heart was somewhat enlarged, and all its cavities

moderately dilated. The valves were all competent. A small dark growth, as large as a pea, projected into the cornus arteriosus immediately below the pulmonary cusps; it appeared to spring from the myocardium. The heart was pale, flabby, and extremely friable. A little patchy atheroma was present in the aorta, and the endocardium was much stained by blood. There were a few small growths on the visceral pericardium. The spleen was normal in size and appearance.

The liver was enormously enlarged, and its proper substance largely replaced by darkly pigmented new deposits. Growths of all sizes were present, some being as small as a pin's head, and some as large as oranges. These larger growths on section showed a dark, almost black, radiate structure. The liver weighed 12 lbs. 6½ oz.

The portal and biliary systems appeared healthy.

In the cortex of one kidney was a small discoloured patch, which at first looked like a growth. The kidneys were moderately enlarged, and their capsules were slightly adherent; the cortices had a decided yellow, fatty appearance. The supra-renal bodies and the pancreas were healthy. No malignant growth was found in the stomach or the bowels. The peritoneum contained about six ounces of a brownish turbid fluid, having a bile-stained appearance (? melanin).

The brain was carefully examined and the only departure from normal which was evident to the naked eye was a decided atrophy of the right optic nerve. This atrophy could not be recognised behind the decussation. The optic thalami and corpora quadrigemina showed no obvious changes.

Sections of some of the growths found at the post-mortem examination were subsequently prepared and examined microscopically. The liver sections revealed the unexpected fact that the growth in this viscus was undoubtedly carcinomatous, the cells being definitely epithelial in type, and presenting a characteristic alveolar arrangement. They are pigmented in varying degree.

The sections of the kidney and of a swollen mesenteric gland contain no new growths. This interesting surprise led to a search for the original growth removed by Mr. Nettleship. The eye, which had been preserved in Müller's fluid, was discovered. Mr. Treacher Collins kindly undertook to prepare sections and report on the ocular growth. His report is as follows:

"The specimen consists of a right eyeball which for some years has been immersed in Müller's fluid, and has consequently become much discoloured. It has been opened by an antero-posterior horizontal section, passing through the centre of a mass of new growth situated in the ciliary region on the inner side of the globe.

"Microscopical sections of the eyeball in the situation of the growth show it to consist of an intra-ocular irregularly pigmented part and an extra-ocular unpigmented portion.

"The intra-ocular portion of the growth is mainly situated in the ciliary processes, which are considerably distended and enlarged by it. Everywhere the unpigmented layer of the pars ciliaris retinæ can be traced on its inner surface, though in places the pigmented layer has become merged in the growth. Anteriorly the growth extends into the iris, involving its superficial parts and rendering its surface very irregular; in places it extends as far as the pupillary margin. The root of the iris is considerably thickened, and the spaces of Fontana are filled with new growth.

"Posteriorly the intra-ocular portion of the growth terminates at about the junction of the plicated with the non-plicated portions of the ciliary body. The circular fibres of the ciliary muscle are replaced by growth, and patches of it are seen between some of the outermost bundles of longitudinal fibres. The extra-ocular portion of the growth lies on the outer side of the sclerotic and beneath the conjunctiva; nowhere has it broken through the epithelium of the latter, though in places they are directly in contact. It extends forwards over the anterior surface of the cornea some little distance internal to the

point where the anterior limiting membrane ends. Posteriorly it extends almost to a point on the outer surface of the globe corresponding to the ora serrata on its inner surface.

"The sclerotic lying between the intra- and extra-ocular portions has, just external to the corneal region, some patches of growth between its fibres; the most extensive of these patches are around the anterior ciliary vessels. The intra-ocular portion of the growth is composed of some very densely pigmented areas, and of others with only a small amount of pigment in them. In the former the shape and arrangement of the cells can only be made out after the sections have been bleached with chlorine; they are not, however, found to differ materially from that in the less pigmented areas.

"The cells composing the growth are of a very small epithelial type, polygonal, with a large nucleus. They present a very definite arrangement, in a number of little groups composed of parallel rows of cells. The space between two parallel rows varies in size, but is never very great, and in some places the rows seem to be in contact with one another. In a few places ill-defined rings of cells can be seen surrounding a small central lumen. In brief, the appearance of the growth is that of a number of small gland tubules, massed very closely together and cut in various directions.

"The extra-ocular portion of the growth is composed of cells of a similar character and having similar arrangement, but almost entirely devoid of pigment granules."

If the unusually long interval which elapsed between the removal of the eye and the discovery of growth in other parts of the body is urged as an argument against the connection between the deposits, at any rate it indicates that the ocular growth was a primary one. That it was also malignant, and therefore likely to be followed by secondary deposits, may perhaps be inferred from its property of local extension and invasion, which led Mr. Nettleship to perform a second operation to clear

out the whole orbit. The main point seems to be whether the ocular growth is sarcomatous or carcinomatous; on this point one pathologist has expressed to us privately his opinion that it is a sarcoma, thus differing from Mr. Collins. We have placed examples of the sections under microscopes this evening, and the opinions of those members of the Society who are skilled in pathology will be especially valuable; for ourselves we do not feel qualified to decide the point, but hope that a definite pronouncement may be made either this evening or after further pathological examination.

(*March 8th*, 1900.)

References for the Purpose of this Paper.

Boucheron.—Societé française d'Ophtalmologie, 1883, Sur l'épithélium aquipare et vitréipare des procès ciliaires.

Nicati.—Arch. d'Ophtalmologie, 1890, p. 490, La glande de l'humeur aqueuse.

Griffiths.—Trans. Ophth. Soc., vol. xiv.

Alt.—Lectures on the Human Eye, p. 123.

Dr. R. Schlipp.—Archiv für Ophth., 1899, Bd. xlviii, Ab. 1, S. 353.

V. Hanke.—Archiv für Ophth., Bd. xlvii, Ab. 3, S. 474.

Pergens.—Arch. f. Augenheilk., 1896, xxxii, S. 293.

Michel.—Archiv für Ophth., Bd. xxiv, S. 140.

Badal and Lagrange.—Archives d'Opht., March, 1892.

Treacher Collins.—Trans. Ophth. Soc., vol. xi, p. 55.

Treacher Collins.—Trans. Ophth. Soc., vol. xiv, p. 83.

Simeon Snell.—Trans. Ophth. Soc., vol. xix, p. 99.

Robertson.—Ophth. Review, vol. xiv, p. 374.

Alt.—American Journal of Ophthalmology, 1899 (cases of adenoma).

The President said the very rare point in connection with the case was the long interval which occurred

between the primary trouble in the eye and the death of the patient from malignant disease. In the case of his own, to which allusion had been made, although there was no opportunity of obtaining a post-mortem examination, the report of the medical man who attended the patient in his last illness left no doubt whatever in his mind that the man died from malignant disease of the liver. In that case, if his memory served him right, death took place after an interval of only three or four years from the time that he removed the eye.

Mr. Treacher Collins said that cases of pigmented carcinomata were exceedingly interesting, and the case just described had some especial points of interest. The only two epithelial structures in the body which normally are pigmented are in the skin and the eye, and so in a case like the present one, where a patient died of multiple pigmented epithelial growths, one naturally looked for the primary growth in one of those two structures. There was no question of there being any growth of the skin in this case, but there was a melanotic growth in one of the eyes thirteen years previously. It might be thought that thirteen years was too long an interval to intervene, before a secondary growth occurred, but if another class of intra-ocular tumours, melanotic sarcomata, was taken, intervals almost as long had been recorded. Some years ago, together with Mr. Lawford, he had followed out the history of a large number of cases operated on for intra-ocular sarcoma, and in some of these the patients died at intervals of nine, ten, and even eleven years after removal of the eye, of what certainly seemed from the history of the cases to be secondary growths.

Not only was there in the present case a growth in the eyeball, but that growth was situated in the ciliary body, and in that portion of the ciliary body which he had described as having gland-like processes jutting out from the pigmented epithelium. There was, therefore, a considerable amount of circumstantial evidence in favour of the tumour in the eye being a primary car-

cinoma. The crucial point was as to its microscopical characters. On first looking at the sections of the growth, he admitted they had very much the appearance of a sarcoma. The cells which composed the growth were very small for epithelial cells. They were much smaller than the cells which he had found in other primary carcinomata of the ciliary body which he had examined, but compared with those in the growths in other parts of the body there seemed a very close resemblance between them. Another very important point in connection with the growth in the eye was that the arrangement of the cells was unlike what was met with in sarcoma. They were arranged in closely massed little groups of parallel rows. This was not due to the tissue in which the growth was forming, because it was met with in the portion of the growth which was in the ciliary body, the portion of the growth which was in the iris, the portion of the growth which was invading the sclerotic, and the portion which was outside the eye; so that it was a characteristic of the growth itself. In some places, too, he believed he could see little rings of nucleated cells like transverse sections of gland tubules. In his opinion the growth was probably a primary carcinoma of the ciliary body, and the case was interesting because it was the first of the sort in which the patient had been definitely known to have recurrence in other organs.

Mr. C. D. Marshall said he had only just had an opportunity of seeing the sections of the growth, and therefore did not feel at all capable of expressing an opinion regarding the nature of the primary growth of the eye, which obviously required a very considerable amount of study in order to make out its features. There appeared to be no doubt that the secondary growths were of an epithelial nature, and therefore must be considered carcinomatous. That opened up the question of the connection between the two; and although in some few cases melanotic sarcomata had appeared after a con-

siderable length of time, yet one could not but look at it as being very unusual for a carcinomatous growth to remain latent for such a long period as the one under discussion had done. He was not acquainted with carcinoma occurring in any other parts of the body where anything like an interval of fourteen years had been known. Perhaps some of the members might know whether such a case had ever been recorded. Anyhow, it was very different from the ordinary epithelioma and carcinoma such as one met with in the breast, lip, and tongue. Among the sarcoma cases that he had worked up and published in the 'Ophthalmic Hospital Reports,' was one which had previously been published by Mr. Lawford and Mr. Collins, where he found that the patient died from secondary growths in the liver, eleven years and five months after the eye had been removed. The longest interval in the cases which he had had the opportunity of examining himself was about three years and nine months.

Dr. Box said that when the case was first investigated it was suggested that the growth in the liver had nothing to do with the original growth in the eyeball, but that it arose probably from a primary growth in some other part of the body. The post-mortem examination was very thorough, and he thought that he could safely assert that, in addition to the enormous mass in the liver, the only growths present in the body were the small deposit in the conus arteriosus and the scattered nodules on the pleuræ and pericardium. If the growth in the liver were held to have no connection with that in the eye, a primary pigmented carcinoma must be held to have originated in the liver, a most extraordinary occurrence.

Mr. Homes Spicer suggested that the case should be referred to the Pathological Committee of the Society for an examination of the tumours.

The President said the suggestion should be carried out.

Report of Committee on Messrs. J. H. Fisher's and C. R. Box's Pigmented Tumour of Eyeball and Multiple Pigmented Growths.

We have carefully examined the microscopic sections of the tumours of the eye and liver which have been submitted to us, and we beg to report as follows :

1. *The tumour of eye.*—The great mass of this tumour has the characters of a sarcoma, in that it consists of differentiated cells of various shapes, with larger nuclei and little protoplasm, mostly non-pigmented, and not contained within alveoli. The only part in which there is apparent alveolation is in the region of the ciliary processes. But when this part is examined under a high power it is seen that what appear to be the walls of alveoli consist of larger pigmented spindle-cells, and not of developed connective tissue. Moreover these spindle-cells merge gradually into the cells within the apparent alveoli, and seem to be intimately connected with them.

2. *The tumour of liver.*—This tumour is quite unlike that of the eye; it is markedly alveolar in structure, and the walls of the alveoli consist of firm, translucent connective tissue, which is entirely distinct from the cells within the alveoli; so much so that in many places the cells have fallen out *en masse* and left empty spaces. The cells of the alveoli are small, with largish nuclei and very little protoplasm, and in many places appear scarcely differentiated one from the other, but rather to form a nucleated mass which fills the alveolus. They cannot be said to have the characters of epithelial cells. On examination of the junction of the tumour and surrounding liver substance, the cells of the latter, though compressed, seem gradually to change into those of the tumour.

We are of opinion that the liver tumour is a carcinoma, but the tumour of eye sarcoma.

Seymour J. Sharkey.
J. B. Lawford.
C. Devereux Marshall.

4. *Retinal detachment; ? intra-ocular growth.*

By Henry Juler.

(With Plate IV, fig. 2.)

Samuel W—, æt. 60, a gardener, was first seen on May 11th, 1900, when he gave the following history.

Six weeks previously he noticed a haze in front of the left eye; since then his sight has been impaired; he sometimes sees a white cloud, which appears momentarily to revolve.

Present condition.—Left eye: vision = fingers; pupil sluggish; tension normal. The optic disc is seen with a + 1 D; it is normal in colour and outline.

A large localised detachment of the retina is seen involving the whole macular region. It reaches almost to the outer border of the disc, and its lower margin is only slightly below the lower border of the disc. Its total area is many times that of the disc. The vertical diameter is greater than the horizontal diameter. The apex of the detachment can be clearly seen with a + 12 D lens; when he was first seen on May 11th, with this lens the apex was just out of focus. Upon the detachment are numerous hæmorrhages of various shapes and sizes, and towards its outer part are seen vessels similar in appearance to choroidal vessels. Close to its upper margin, and beyond the detachment, are two small white glistening dots. Immediately beyond the lower and outer part of the detachment, the fundus has a feathery, striated appearance, as if produced by folds in the retina.

Right eye: vision $= \frac{6}{24}$; $\bar{c}$ + 1·75 D spherical $= \frac{6}{6}$. Fundus and media normal.

Personal history.—Thirty years ago he had rheumatic fever. Three years ago he had influenza. There is absence of any history of injury, venereal disease, gout, loss of flesh, a tumour elsewhere, or residence abroad. His urine is normal.

He has lost one brother and two sisters from "consumption."

Remarks.—The localised nature of the detachment at the central part of the fundus, the vascular appearance of the subretinal tissue, the steadily increasing elevation of the detached portion of the retina, and the absence of myopia or anything else to account for the detachment, seem to favour the diagnosis of sarcoma of the choroid. The case seems to resemble Mr. Jessop's case recorded in vol. xvii, and Mr. Arnold Lawson's case in vol. xviii, of the Society's 'Transactions.'

(*Card specimen. June 14th*, 1900.)

Mr. Johnson Taylor said that a few years ago he showed to the Society a case somewhat like Mr. Juler's with a history of eleven years' failure of sight with central detachment of the retina. He excised the eye, and it turned out to be leuco-sarcoma.

Mr. John Griffith said he had seen the detachment, and noticed there were vessels immediately beneath the retina of a choroidal nature. If the tumour was cystic he did not think the cyst would be behind the choroid, but between the retina and that structure. He believed it was a solid growth.

Mr. Holmes Spicer said he had little doubt that the case was one of new growth, and it reminded him of one shown before the Society by Mr. Silcock two or three years ago, of a large detachment of retina in the macular region. Mr. Silcock on that occasion demonstrated that it was of a cystic nature by puncture with a needle, observing with the ophthalmoscope at the same time. The result in that case was that the swelling subsided after puncture. If Mr. Juler had doubt of the present case, he suggested puncture to prove it.

Mr. Jessop thought it was a new growth, almost exactly like one he himself showed two years ago. The slight difference consisted in the fact that in his (Mr. Jessop's) case there was some pigment showing; it turned

out to be a leuco-sarcoma. He punctured it, as Mr. Spicer now suggested, without producing any effect on the swelling. That might be tried in the present case, but he felt no doubt that it was a new growth.

Mr. Juler said he had not much faith in puncture.

Additional note (July 26th, 1900).—The eye was excised on July 13th, and hardened in 10 per cent. solution of formalin. A horizontal bisection of the globe was made, and a subretinal tumour was found in the neighbourhod of the macular region, and almost entirely confined to the upper half of the eyeball, which is here described.

The retina is detached outwards from the optic disc for a distance of 8 millimetres. This space is completely filled by a tumour composed of four distinct portions. Close to the sclerotic is an oval nodule, 6 mm. long, and 1·5 mm. high. It is of a whitish colour, with numerous very fine grey dots upon its surface. Between this and the detached retina is a larger almost sperical and perfectly separate nodule, 6 mm. long, and projecting forwards to the extent of 5 mm. It is white in colour, and its anterior surface presents four distinct black dots, and numerous very fine red points, presumably hæmorrhages. The spaces between these nodules, towards the optic nerve and outwards, are occupied by blackish masses, that on the outer side being the blacker and larger of the two.

Upwards and outwards from this detachment, there is what appears to be a second detachment. This is more extensive and less varied. It is oval in shape, being 12 mm. equatorially by 8 mm., dark, almost black in colour, and only projects a few mm. above the normally placed retina. On dissection, it is found that this is continuous with the other detachment.

On microscopical examination the white masses are found to consist of small round-celled sarcoma. There is very little pigment present. Throughout the growth are

thin-walled dilated blood-vessels. The black masses consist of albuminoid substance with large masses of pigment, some of which is free and some contained in cells, which are probably proliferated normal pigment cells.

VII. DISEASES OF THE OPTIC NERVE.

1. *Two cases of primary neoplasm of the optic nerve.*

By E. Treacher Collins and C. Devereux Marshall.

(With Plate V.)

During the last session of this Society two papers were read dealing with cases of tumour of the optic nerve or its sheaths, but so rare are these, and so different are the appearances which the growths present microscopically, that we have not hesitated in bringing two fresh cases before you this evening.

To show how rare they are, we may mention that during the last fifteen years (that is from 1885 up to the present time) only two growths of the optic nerve have been removed at the Moorfields Hospital, whilst during this time 388,000 patients have been treated.

As to the difference in the microscopical characters of the neoplasms, we find that of the five cases which have been recorded in this Society's 'Transactions,' one is described as a fibroma (Brailey, vol. ii), one as a sarcoma of the sheath (Brailey, vol. vii), two as gliomata (Rockliffe, vol. xiii, and Bullar and Marshall, vol. xix), and one as a myxo-fibroma of the sheath (Arnold Lawson, vol. xix).

Case 1 is that of a healthy-looking boy, Harry L—, æt. 5 years, who came under the care of one of us at the Moorfields Hospital on August 24th, 1899.

His father stated that the boy's right eye had been more prominent than its fellow during the last eight months, that the amount of prominence had during that time gradually increased, and that the sight of that eye had failed.

On examination it was found that his right eye was

markedly proptosed and at the same time displaced a little downwards. The movements of the globe laterally and downwards were unrestricted, but there was slight defect in the movement upwards. No swelling could be felt in the orbit.

The pupil of the affected eye was larger than that of the other, and was inactive to light. The lens and vitreous were clear. The optic disc was somewhat pale, and its margin was ill-defined; the retinal veins were large and tortuous. In the region of the optic disc it was estimated that there were 4 D. of hypermetropia. The tension was normal, and the vision was hand movement only.

The presence of proptosis with but slight eccentric displacement of the globe, and but little limitation of movement, together with loss of sight, pallor of the disc, and tortuosity of the retinal veins, led, at that time, to a tumour of the optic nerve being suspected. It was, however, thought well, before resorting to any operative procedure, to try first the effect of a course of treatment with iodide of potassium. Five-grain doses were given three times a day for a month. At the end of that time the proptosis was found to have increased, and the amount of hypermetropia in the region of the disc to have become 9 dioptres.

It seemed impossible to conceive of any condition, other than a new growth in or around the nerve, capable of producing proptosis and an increasing amount of hypermetropia.

On September 21st, 1899, the patient having been anæsthetised, an exploratory incision was made through the skin and palpebral ligament at the outer margin of the orbit, and the finger was then passed back to the optic nerve, which was felt to be enlarged. The eyeball was then enucleated in the ordinary way. At the first cut with the scissors through the nerve only a portion of the growth was removed, the remaining part was felt for and divided close up to the optic foramen. The patient

was last seen on November 6th, 1899, and was in good health with no sign of recurrence.

Pathological description.—The eye to external appearance is healthy. The optic nerve is greatly enlarged, it being at its thickest part 13·5 mm. in diameter. The enlargement is spindle-shaped, and commences close to the sclerotic in front, reaching backwards 23 mm. At its posterior extremity the optic nerve is slightly larger than normal, and the cut surface has a gelatinous appearance, rather like that of the tumour. The dural sheath is not involved, and can be stripped off as in a healthy nerve.

On section the eye itself is normal, though somewhat compressed in its antero-posterior diameter by the tumour.

The optic nerve, which is so much enlarged, has, on section, the following appearance. Exactly at the lamina cribosa it differs but little from normal, but immediately it leaves the sclerotic it commences to enlarge. The central portion of the new growth is dense and looks like a very hypertrophied optic nerve. The peripheral portions appear less dense, and seem to be composed of tissue surrounding the nerve, probably thickened pial sheath.

The central artery can be seen in its usual situation in the centre of the nerve.

Microscopical appearance.—Transverse sections of the growth show it to be mapped out into areas by a thick network of bundles of connective tissue containing small blood-vessels. This fibrous-tissue framework resembles that of the normal nerve, except that its component parts are much thicker and denser.

In the interspaces of this network instead of bundles of nerve-fibres supported by delicate connective tissue, the nerve-fibres seem to have all disappeared, leaving empty spaces very much reduced in size, whilst the supporting connective tissue is everywhere increased, thickened, and more cellular than normal (Plate V, fig. 1).

In longitudinal sections the spaces left by the atrophied nerve-fibres do not show, and the spaces between the

PLATE V.

Illustrates Messrs. E. Treacher Collins and C. Devereux Marshall's paper on Two Cases of Primary Neoplasm of the Optic Nerve (p. 156).

FIG. 1 shows the microscopical appearances of a transverse section of the growth from Case 1.

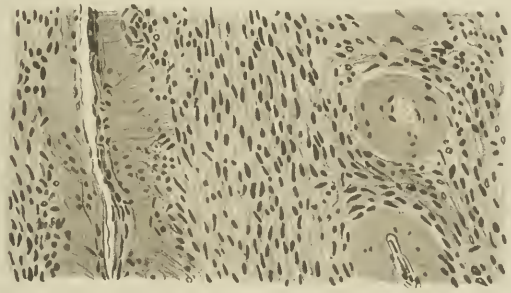
FIG. 2 shows the microscopical appearances of a longitudinal section of the growth from Case 1.

FIG. 3 shows the microscopical appearances of a transverse section of the growth from Case 2.

Fig. 1.

× 100.

Fig. 2.



× 100.

Fig. 3.

× 100.

H. Lapidge, del.

Bale & Danielsson, Ltd., Lith.

bundles of fibrous tissue appear filled with long spindle-shaped cells, which at the borders of the trabeculæ merge into and mix with the fibrous tissue (Plate V, fig. 2). The thickened pial sheath is also seen to be composed of collections of spindle-cells and strands of fibrous tissue, the latter less dense and thick than in the nerve itself.

Case 2, Mrs. P—, æt. 46, was under the care of Mr. Austin Reynolds and Mr. Poulett Wells, who stated that the patient was suffering from detachment of the retina with hæmorrhages and proptosis. The vision of the right eye had been failing for nine months, and the condition was gradually getting worse. Tension ? + V = no P. L. The movements of the eye were quite normal and not impaired in any direction.

The presence of an intra-ocular growth extending through into the orbit was suspected, and it was decided to exenterate the orbital contents.

Owing to illness Mr. Poulett Wells asked one of us to operate for him, and on November 30th, 1897, enucleation of the eyeball was performed in the usual manner. On division of the optic nerve it was found to be considerably enlarged, and although it had been divided far back, the incision had gone through the middle of a new growth, and a large mass was still left. As it was considered probable that it might be of a malignant nature, the contents of the orbit were removed, the optic nerve being divided as close to the foramen as possible.

Pathological examination.—After hardening the following condition was noted. The anterior part of the eye is healthy, except that the lens has numerous congenital opacities on it and in it. The vitreous is clear. The optic disc does not appear to be altered, there are numerous hæmorrhages in the retina; but there is no intra-ocular neoplasm.

The optic nerve is very much enlarged, and forms a fusiform swelling measuring 7·5 mm. in diameter at its thickest part. The swelling commences immediately the

nerve leaves the eye, and is continued backwards nearly up to the point of section.

Microscopical appearances.—Transverse sections at the thickest part of the tumour show a somewhat thickened pial sheath, immediately beneath which is some round-celled infiltration. From the pial sheath dense processes of connective tissue extend inwards, and separate off spaces in which optic nerve-fibres were originally located; but these are now occupied with a network of irregular branching cells in which not a single healthy nerve-fibre is visible (Plate V, fig. 3). The vessels are not unduly enlarged.

We see that the growths in these two cases, though somewhat similar, are in certain respects different. In the first case the pial sheath in much involved, and in the second it is but slightly thickened. In both cases the fibrous-tissue trabeculæ which extend into the nerve from the pial sheath are thickened, but much more markedly so in the first case. In both there is an increase in the supporting tissue network of the nerve-fibres in between the fibrous-tissue trabeculæ, which is also much more cellular and more like embryonic tissue than normal; but in the first case the cells are definitely large and spindle-shaped, while in the second they are indefinite, many of them being irregular and branching. In both, in the region of the growth there has been complete destruction of the nerve-fibres, small circular spaces being left where they formerly extended.

A point of interest in connection with the second case is that the appearance which is presented clinically had suggested the possibility of its being a case of sarcoma of the choroid.

A case of new growth of the optic nerve accompanied by retinal detachment, which was also clinically taken to be a sarcoma of the choroid, has been recorded by Dr. Brailey in vol. ii of this Society's 'Transactions.'

In his case, as in ours, no new growth in the eye was

found. Microscopically the growth in the optic nerve was seen to be principally due to a new formation of fibrous tissue within it. "A hypertrophy of the trabeculæ evidently forming the basis of the new growth."

The names and descriptions which have been given of the pathological characters of tumours of the optic nerve are exceedingly numerous and varied, but it is highly probable that many of them which have been described under different names are essentially of the same nature.

Tumours of the optic nerve are so rare that few observers have had the opportunity of examining sections of more than one.

We are fortunate in being able to show to the Society this evening the macroscopic and microscopic characters of six of these growths collected from different sources. Careful study of these leads us to believe that they are all primary growths of the connective-tissue framework of the optic nerve. This consists of the pial sheath, prolongations of the fibrous tissue forming trabeculæ in the substance of the nerve, and a delicate connective tissue (the so-called neuroglia) supporting the nerve-fibres in the spaces left between the trabeculæ.

In some cases the growth seems to have involved all these elements (Case 1, Lawson's case, and Bullar and Marshall's case). In others, one or other part is more extensively affected (Case 2 and Rockliffe's case). In some the development of the tissue composing the new growth is more highly organised than in others; thus, whilst in some a large amount of fibrous tissue is met with which would justify their being described as fibromata, in others the tissue is of a more embryonic type and the cells vary from spindle-shaped to branching or round, as is met with in the developing optic nerve. Thus the terms glioma or sarcoma would appear applicable. In others, again, tissues of varying degrees of organisation are met with in the same growth, suggesting such compound names as fibro-sarcoma, etc.

We have arranged sections of the six collected cases in

order, showing the relative degree of development of the tissue composing the new growth. Thus we have :—

Case 1 composed of fibrous tissue and long spindle-cells ;

Cases 2 and 3 (W. W. Sinclair) with thickening of the fibrous trabeculæ and a network of irregular cells ;

Case 4 (W. C. Rockliffe) with hardly any increase of fibrous tissue, but many large and branching cells.

Case 5 (G. Lawson) is somewhat similar to Case 4, but the cells are rounder in shape and less branching.

Case 6 (Bullar and Marshall's) is the most lowly organised of any, and is composed almost entirely of round cells.

In studying the published reports of optic nerve tumours it will be noted that in many of them myxomatous changes are described. In none of the six specimens which we have had the opportunity of examining have we been able to discover any true myxomatous changes. In most of them vacant spaces are to be seen scattered throughout the growth, some small, some large, but in none of them have we been able to detect any mucoid material.

Some of these spaces are certainly channels in which the nerve-fibres were contained, but which, owing to their complete atrophy, have been left vacant.

In conclusion we would urge that much of the confusion which has arisen with regard to the nature of optic nerve tumours is due to the nomenclature which has been adopted, and that this confusion is only likely to be cleared up by recognising the essential principles which account for the varied appearances which they present, such as those which we have endeavoured to indicate.

(*November 9th*, 1899.)

Dr. Rockliffe said he would like to know whether there was any history of general bodily weakness in the cases mentioned. In the one he showed some years since the diagnosis was somewhat uncertain, so much so that only one member of the Society ventured a diagnosis of tumour of the optic nerve. The general opinion was to postpone interference, and the patient was therefore

watched for some time, during which he appeared in perfect health and able to do his work to within a week or two of the removal of the growth, prior to which he became very emaciated, unable through debility to stand, listless, and apparently gradually dying. He was carefully examined by my colleague, the physician for the week, but no trace of any disease could be detected. Immediately after removing the growth the patient regained his ordinary health, and has remained well. He believed the tumour in his case to be identical with those now recorded ; nevertheless they differed considerably in the microscopical appearances, inasmuch as these specimens consisted almost entirely of round cells, with little or no stroma, whereas in his case the greater part was fibrous with very few cells, which in addition were distinctly branching. In Mr. Sinclair's case the naked-eye, as well as the microscopic appearance, was very similar, and he gave the same sort of history, viz. very slow, but certain growth. It would be interesting to know whether all such cases presented these symptoms of slow growth with general debility.

Mr. Devereux Marshall, in reply, said in the cases narrated in the paper the general health was not very much affected before the disease. In the case which he recorded with Mr. Bullar last year, the increase in the growth was very rapid indeed, and he, Mr. Marshall, gave a lantern demonstration showing photographs of the patient at successive periods before the operation was undertaken. The last of these showed immense proptosis, so that the lids could not be closed ; greater proptosis he had never seen before or since. That was explained to a great extent by the fact that in its centre was a cystic space, so that the solid growth was not so large as it appeared before removal. The patient had remained in good health since. In that case it was impossible for the tumour to have been removed quite completely, as it apparently extended further back than the posterior limit of the orbit. Still, the tumour had not

recurred. In one of the cases recorded this evening the end of the optic nerve which was cut appeared gelatinous, and, although it was cut back at the optic foramen, the disease seemed to extend further. In none of the other cases, so far as he was aware, was the general health anything like so much affected as in Mr. Rockliffe's case.

With regard to the microscopical appearance, that was rather a large question. Mr. Collins and he had given a great deal of attention to the cases, and had established to their own satisfaction that there was a gradual transition between the growths, some of which were more fibrous and others more cellular; they also found it made a great deal of difference whether the sections were cut tranversely or longitudinally. In the transverse section the cut ends only of the cells could be seen, but in the longitudinal section large branching cells could be observed. In the sections exhibited in the other room, some were cut one way and some another, and he quite sympathised with any one who on first looking at them failed to detect that they were in any way related.

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2. *Further note on a case of optic nerve tumour previously reported to the Society.*

By C. Devereux Marshall.

In November of last year I reported to the Society, in conjunction with Mr. Treacher Collins, a case of optic nerve tumour which I operated on on November 30th, 1897, at the request of Mr. Poulett Wells.

This patient remained in very fair health until shortly before her death, which took place on May 4th, 1900 (two and a half years later). Owing to the kindness of Mr. Austin Reynolds, who attended her up till the time of her death, which occurred very suddenly, I was enabled to obtain a post-mortem examination.

The autopsy was made on May 6th, and the following was the condition found :

On removing the calvaria, the middle meningeal vessels were found to be much distended and the Pacchionian bodies were very large. The cerebral convolutions were much flattened. The optic chiasma had entirely disappeared, and its place was occupied by a large, diffuse, and very soft tumour, about the size of a bantam's egg. So soft was it that its actual limits could not be defined, and the greater part of it could easily have been washed away with a moderately strong stream of water. The centre of the growth was the right optic tract, and it spread along the chiasma, involving the tract and optic nerve on the left side, both of which were considerably enlarged. The tumour reached the pons on both sides, invaded the lateral and third ventricles, and on the left side the optic thalamus and corpus striatum. The growth was so very diffuse that it appeared that the third, fourth, fifth and sixth nerves on both sides are more or less included in it. On both sides the under surfaces of the temporo-sphenoidal lobes were invaded. The tumour was still further broken down by recent hæmorrhage in the vicinity of the left optic tract. No separate deposits were found in the brain, and the growth had evidently spread by continuity only.

In the thorax nothing abnormal was found, except that the mitral valve was much thickened.

In the liver a few cysts were found containing clear fluid, but it was otherwise healthy, and there was no sign whatever of any new growth.

The spleen, pancreas, and uterus were free from disease, but the kidneys were slightly granular, and the capsule tore the kidney tissue in separating.

The aorta was somewhat atheromatous.

The microscopical appearances of sections of the growth closely resemble those of the original nerve tumour. The main substance of it is made up of a network of irregular branching cells, in which are small spaces, mostly circular,

similar to those described as being present in the original nerve tumour, and which were thought to be channels from which the nerve-fibres had disappeared. Seeing that this also is a growth mainly involving medullated nerve structure, probably the same explanation of the spaces holds good. Here and there are strands of a denser fibrous tissue, in which blood-vessels are seen in section.

Briefly, the neoplasm seems to be due to an immense overgrowth of the connective-tissue framework of the nerve, mainly the neuroglia, but also of the more fibrous prolongations from the pial sheath.

The optic nerve on the opposite side is much enlarged, and on examining it microscopically the sections are seen to present precisely similar appearances to those of the right nerve, which was described in the original paper.

In the last volume of the 'Transactions' will be found a paper by Bullar and myself, the basis of which was a case of optic nerve tumour, somewhat similar to that described this evening, and at the present time, three years after removal, the patient is alive and well. In this paper the question of prognosis is fully discussed, and the conclusion arrived at from published cases was that the disease, although of not a very malignant type, could by no means be considered innocent, and it was advisable to remove it as thoroughly as possible. This remark is justified by the present case, in which although the nerve was removed as completely as possible, it was affected further back than the orbit, and this was the way by which the growth reached the brain.

The degree of malignancy doubtless depends upon the character of the growth, those of a more embryonic type of tissue being in a higher degree malignant than those better organised, but in any case of optic nerve tumour it is important to recognise the probability that it is of a malignant nature and one calling for radical treatment.

(*July 6th*, 1900.)

3. *Primary optic atrophy with diabetes insipidus.*

By W. T. Holmes Spicer.

Morris S—, a Jewish male, æt. $12\frac{1}{2}$, was first seen in July, 1899, on account of difficulty in reading. His vision had only been failing a few days.

He had been in the habit of passing very large amounts of water for about two years, as much as nine pints in the twenty-four hours. He was always a well-nourished boy, but during the past year he has been getting much stouter.

He never had any head injury, or symptoms of cerebral disease. He had been under careful observation and treatment as an in-patient at St. Bartholomew's Hospital, under Dr. Hensley, with diabetes insipidus, for many months, but no cause for the diabetes was found, and no cure for it. He never had fits. One uncle went blind at 50; no others in his family were blind.

When first seen V. was R. $\frac{6}{60}+2$ sph. $\frac{6}{24}$ J. 8; L. $\frac{6}{60}+$ 1·75 sph. $\frac{6}{24}$ J. 8. He did not return to the hospital till December 27th, 1899, when his vision had much fallen off; it was R. $\frac{3}{60}$; L. Fingers eccentrically. The first description of the condition of the optic nerves was then given. They were both very white and clear, with no trace of previous neuritis; typical primary atrophy. The right visual field was not contracted in any part; the left one could not be satisfactorily taken by the perimeter, as he had lost central fixation, but the whole of the nasal part of the field was gone. There was no central scotoma in either eye, and his perception of colour was quite good.

He was a well-grown and well-developed boy, but very fat; he was very intelligent. Urine almost colourless; 1003, acid. No albumen; no sugar.

(*Card specimen. January 25th*, 1900.)

P.S. (July 20th, 1900).—The prognosis given was extremely unfavourable, and the parents expressed a wish to take the patient to see Prof. Snellen. The letter which I sent with the patient was answered by Prof. Snellen on March 6th. He was inclined to think of tumour of the brain, on account of the sleepiness, but sent the boy to Prof. Stokvis, of Amsterdam. He took the case for one of myxœdema, and proposed thyroid or iodothyrin in small doses with anti-diabetic diet, in order to diminish the thirst.

The patient returned to London, and went to University College Hospital as an in-patient on March 15th; he was treated for two weeks with thyroid tabloids; he became ill, with high temperature, and was taken out of the hospital by his parents on April 9th.

The patient died before the end of April; no post-mortem examination could be obtained.

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4. *Sections of healing stump of optic nerve four days after enucleation.*

By John Rowan.

The specimen was obtained from a shrunken eye, enucleated on account of pain. The patient dying four days later of acute general tuberculosis, diagnosis confirmed post-mortem. The section of the optic nerve shows considerable round-cell infiltration and some atrophy, most probably the result of previous inflammation. The enucleated eye contained a large deposit, evidently tubercular (the method of preparation unfortunately prevented staining for the bacilli), and the iris had prolapsed in several places.

At the cut extremity the optic nerve sheath is seen folding round the end of the nerve, and there is a large blood-clot becoming organised.

The blood-clot organised at the central part of the section, and the folding ends of the optic nerve sheath are evidently approaching each other to form a completely rounded and well-protected stump.

The condition is seen to be taking place all round, as peripheral sections show the end of the optic nerve tapered off.

(*Card specimen. June 14th,* 1900.)

VIII. DISEASES OF THE ORBIT.

1. *Pulsating exophthalmos (congenital).*

By W. C. Rockliffe, M.D.

H. H—, æt. 22 months, attended the Hull Royal Infirmary, July 2nd, 1899, with the following history :

She is one of a family of eight, all apparently healthy, and no instruments were used at birth. There is no history of injury.

The child probably had purulent ophthalmia, which yielded to treatment in five weeks, when the mother remarked the swelling of the lids remained and that the right globe was prominent, since which time the proptosis has increased; otherwise the child has been in good health.

On examination.—R. E. : There was swelling of upper and lower lids ; slight ectropion of the outer extremity of upper lid, with distended veins. The proptosis was inwards and downwards. Eye moved freely in every direction ; no chemosis ; slight conjunctivitis. No solid growth, bruit, pulsation, fluctuation, tenderness or pain, but a soft cystic growth could be felt deep in the orbit. V. apparently normal. L. E. normal.

Under chloroform.—The globe pulsated synchronous with the systole, and a moniliform tumour was felt deep in the orbit. The pulsation was partially controlled by pressure on the carotid ; but no bruit could be made out. This condition varies ; some days the swelling diminishes considerably, and there is no visible pulsation, while at other times it is most marked ; but under an anæsthetic

the pulsation is marked in the eye, but not always in the growth.

During the last fortnight the child has lost flesh, but otherwise is healthy and devoid of pain.

(*Card specimen. October 19th*, 1899.)

The PRESIDENT said he thought no harm could come from trying electrolysis, though his own experience in a similar case was not very fortunate.

Dr. ARGYLL ROBERTSON said he had had two cases of pulsating tumour of the orbit, which were subjected to electrolysis. In one case the result was perfect; the tumour consolidated after two applications, and the result eventually was that the eye returned into the orbit, and perfect vision was restored. From pressure or from stretching of the optic nerve the sight, at the time of operation, was to a certain extent affected. In the other case the result was not quite so good. It was a case of very large pulsating tumour of the orbit, which had been allowed to grow to such an extent that the eye was projected far out of the orbit, and the swelling which resulted from the second application of electrolysis produced so much protrusion of the eye, and it was for so long uncovered by the eyelid, that suppurative inflammation eventually resulted. But as far as the tumour was concerned the electrolysis produced an admirable effect; it became consolidated, so that the eye could be enucleated, and an artificial eye was adapted. Both those cases differed, however, to a certain extent from that brought under notice that evening, inasmuch as under an anæsthetic and at other times there was pulsation and a bruit. He regarded the present case as one which might be in the incipient stage of pulsating tumour of the orbit, in which during anæsthesia an increased flow of blood into the vessels at the back of the eye produced pulsation, whereas under normal conditions that was not the case. In any case he had no doubt the tumour was extremely vascular, and he thought it a case admirably

adapted to electrolysis. As the history showed the tumour to be increasing, there could be little question that if left alone the condition would be much more serious.

Mr. Ernest Clarke said that, reference having been made to the case he showed in 1894, he might mention the points in which it differed from the present one. Firstly, pulsation was always present in his case; and, secondly, the proptosis was never so marked. The eye from the time it was first seen was useless, and the history left little doubt that it was a congenital defect. The electrolysis was performed by Dr. Lewis Jones, of St. Bartholomew's, and was done very gradually—ten or twelve sittings,—the condition certainly improved a little. But the boy continued to present himself at the hospital with the eye looking down and pulsating as it did five years ago. He advised the parents to have the eye removed, as he thought that the wisest course in all such cases, and he would advise Mr. Rockliffe to do the same. The electrolysis had to be carried out under chloroform, and a lot of irritation and inflammation ensued about the eye. His child was ill for a fortnight after some of the sittings.

P. S. (July 14th, 1900).—Child seen to-day; the swelling of the lids and the proptosis have considerably increased, but otherwise the child is in the best of health; any active interference has therefore for the present been postponed.

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2. *Proptosis of left eye; (?) orbital tumour.*

By Henry Juler.

The patient is a man æt. 21, who works in a laundry. He came under my observation for the first time on the 3rd of last March, complaining of great pain in his left

orbit and failing sight. He had marked proptosis and diplopia.

The following history was elicited from him. Five years ago he had a similar attack on the same side; severe pain in the orbit, followed by great prominence of the eye, with loss of movement within forty-eight hours. The eye was not red, nor was the sight impaired; in fact, at that time the sight of that eye was better than that of the right. For nine months he suffered great pain by night, —comparatively free by day,—but did not seek advice. In September, 1896, he went to the Central London Ophthalmic Hospital, attending three weeks as an out-patient, and then was admitted for two months. There he was told that he had a tumour behind the eyeball. He took some medicine, and had some drops applied to the eye. The pain disappeared and the proptosis became less. After leaving the hospital he suffered from no inconvenience for a period of three years; there was no pain, the swelling became less, but he recovered no movement. His vision remained good.

His previous illnesses consisted of some abdominal complaint, for which he was admitted four times four consecutive years to the University College Hospital. No history of measles or scarlet fever. He is the only child in the family. His mother died of typhoid; his father is still alive.

When admitted on March 3rd the following signs were present:—proptosis of left eyeball, chiefly in a forward direction, slightly inwards; slight ptosis and complete ophthalmoplegia externa. The conjunctival veins were distended and tortuous. Two small adhesions of the iris to the lens, otherwise pupil active. Upon applying pressure to the eyeball there was a sense of resistance, but the eyeball did not pulsate. There is no bruit. The vision was $\frac{6}{18}$ Sn., and the fundus at that time normal.

While under observation pronounced neuro-retinitis has developed in his left eye only, and the vision is reduced

to perception of light. The direct pupillary reflex is lost. The proptosis has somewhat increased.

The patient is somewhat stunted in growth, has an earthy complexion, and suffers from deafness in his left ear. For many years he has had a discharge from it. Under his lower jaw is a scar, the result of a past abscess. His heart and lungs are healthy; his reflexes are exaggerated. There is no positive evidence of hereditary syphilis.

The treatment adopted has been iodide of potassium in increasing doses. For a short time he had mercurial inunctions.

Remarks.—The chief interest in the case is the diagnosis. There can scarcely be much doubt that there is an orbital tumour. The history of the case strongly argues in favour of a tumour of inflammatory origin. The three years' period of quiescence, and the presence of signs of past iritis, are opposed to a tumour in the strict sense of the term. I am inclined to regard the symptoms as dependent upon a granuloma in the orbit, involving very intimately the optic nerve close to its entry into the eyeball. Whether this be tubercular, syphilitic, or of some other type, it is difficult, if not impossible, to say.

(*Card specimen. May 3rd*, 1900.)

Mr. Beaumont said the iris had the appearance of a persistent pupillary membrane, which seemed to indicate that he had had some intra-uterine iritis. The details of the fundus could be seen best with a + 8 or + 10 glass, as if he had either detached retina—which he did not think was the case,—or else that the posterior wall of the globe was bulged forward by the tumour,—which he thought was the case.

Mr. Nettleship said he thought the case was one of intra-ocular tumour. There was a globular swelling, which could be seen with a + 8 glass, near the disc or protruding from it.

Mr. W. T. Lister said when he saw the case at the

Central London Ophthalmic Hospital, the vision of the left eye was better than that noted by Mr. Juler (L. V. $\frac{6}{12}$ with Cy. + 2 axis horizontal $\frac{6}{9}$). In his opinion there were definite marks of inherited syphilis about the patient; the teeth were very suggestive, and so was the physiognomy.

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3. *Exophthalmos on stooping. Intermittent exophthalmos.*

By Reginald E. Bickerton.

Mrs. E. C—, æt. 51, charwoman, attended Moorfields Hospital on March 26th, 1900, under Mr. Treacher Collins, complaining of pain in right eye. It had been operated on thirty-six years ago by Mr. Dixon, and now shows an operative coloboma and a central corneal nebula. Vision: R. $\frac{1}{60}$ with difficulty, not improved.

The eye while patient is standing erect occupies a normal position, and shows no exophthalmos. Lid movements perfect and normal. On stooping down this eye becomes proptosed, the lids become slightly suffused with blood, and if this position is maintained considerable pain is felt in the eye. On her again resuming the erect posture the eye rapidly sinks back to its normal position. On her lying on the right side the eye becomes proptosed, and she has to press it back to relieve the pain; it also becomes proptosed on compression of right jugular, but not to so marked an extent. On removing the pressure from the vein, the eye again resumes its normal position.

There is no pulsation to be felt, and no bruit heard.

No specific history. No history of injury to orbit, eyeball, or head.

Double cardiac mitral murmurs.

Patient states that since the operation this eye has never felt quite right, the only cause given for the condition being "through stooping down while washing floors, etc."

The pain and exophthalmos have become much aggravated during the last two years.

When proptosed the eye shows an external strabismus.

Similar cases have been shown and reported by Lang and Thompson ('Transactions,' xvii, 1897), Priestley Smith, Herman Becher in Breslau, and Treacher Collins.

Eight cases are mentioned by Lang and Thompson.

Twenty-three cases by various ophthalmologists are referred to in 'Graefe's Archives' (vol. xli, 1895).

(*Card specimen. May 3rd*, 1900.)

Mr. Adams Frost said the case reminded him of one of pulsating exophthalmos shown by him before the Society ('Trans.,' iii, 9). The condition had existed since childhood. At the age of 51 the patient had had a severe attack of what appeared to be cellulitis, but was probably phlebitis; after this the whole condition cleared up and disappeared.

Mr. A. Hugh Thompson said he showed for Mr. Lang a case like Mr. Bickerton's three years ago, and at that time the literature of the subject was looked up. It showed that in half the cases there was a history of traumatism. He believed that in Mr. Bickerton's case there was no history of injury.

IX. CONGENITAL ABNORMALITIES.

1. *Congenital subluxation of crystalline lenses.*

By Sydney Stephenson.

Annie G—, æt. 7 years, first seen September 14th, 1899.

History.—Mother states that the patient is the youngest of eight children, of whom five died in infancy. A ninth child was born prematurely at the seventh month. None of the brothers or sisters were deformed in any way. Nothing is amiss with the eyes of the patient's father or mother, neither can any history be got of defective eyes in grandparents, etc.

Present state (*general*).—The child, of delicate appearance, is mentally backward and extremely nervous. Her height is 47⅛ inches; her weight 43½ lbs. She presents a small umbilical hernia, as well as a post-anal dimple.

Eyes.—The right eye is divergent, and the patient has a tendency to keep the left eye semi-shut. The *corneæ* are clear, with well-defined margins; the transverse diameter of each is 11 mm. The *anterior chamber* is of unequal depth, being shallower at its upper end and inner part than elsewhere. Each *iris* is markedly tremulous, except in the inner and upper segment. The undilated *pupils* have a transverse diameter of 4·5 mm., react to light (direct and indirect) and to accommodation, and lie not in the centre of the iris, but somewhat towards the upper and inner part of that structure. When the pupils are dilated,* as by atropine, it can be seen that the *crystalline lenses* are partially dislocated, the right one

* Response to atropine imperfect; dilated pupils measure 6 mm. only.

upwards and slightly inwards, the left one upward and markedly inwards. Each lens is transparent and of a faint greyish-white colour. Its lower margin is free from notches and projections, and takes the form of a curvilinear line crossing the pupil.

The lenses, which are slightly tremulous, seem to be more globular than usual. By focal illumination, and better still by using a strong positive glass with the ophthalmoscopic mirror, the *suspensory ligament* may be seen as more or less radial filaments, of a greyish-white colour, bridging over the corners of the interval between the lower margin of the displaced lens and the edge of the dilated pupil. It is to be noted that they are absent from a more or less triangular area which occupies the approximately central parts of the lensless portion of the pupil. The *optic discs* are well defined by means of a + 10·5 D. spherical lens. In the R.E. there is a crescent in the outer third of the disc, and two small angular pigment-spots lie about ·5 P.D. below the papilla in the angle formed by two branches of the inferior nasal vein. The crescent present in the left eye is not so well defined as that in the right eye, and involves the lower as well as the outer side of the optic disc.

T. n.

R.V. $= < \frac{6}{60} + 10{\cdot}5$ D. sph. $= \frac{6}{24}$
L.V. $= < \frac{6}{60} + 10{\cdot}5$ D. sph. $= \frac{6}{18}$ } approximately.

(*Card specimen. October 19th*, 1899.)

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2. *Congenital subluxation of the lens; secondary luxation forwards; operation; result.*

By George Keeling.

Kathleen S—, æt. 20, was first seen six years ago, when she came complaining of short sight. She was found to have congenital subluxation of both crystalline

lenses upwards and outwards, with a high degree of myopia. She was ordered −8 D. sph. for each eye. She wore these for three years, when they were changed for −15 D. spheres.

Last July it was found that the left lens had become secondarily luxated into the anterior chamber, with a consequent diminution in the acuity of the vision.

Early in September she began to complain of pain in the eye and over the forehead, and on September 19th the tension was slightly raised.

On September 22nd I attempted a discission of the lens in the region of the equator, intending to follow it up with a paracentesis. However, I failed to perforate the capsule, which became invaginated before the point of the needle. After repeated attempts I postponed any further operation.

On September 25th the eye showed no signs of any previous operation, so I extracted the lens with a scoop, the corneal section being made with a keratome.

Present condition.—Right eye : Subluxation of lens downwards and outwards ; 24 dioptres of myopia, which is increased to 32 dioptres under homatropine.

Vision $\bar{c}$ − 20 D. = $\frac{6}{18}$ (two letters).

Left eye : Condition of aphakia ; refraction by retinoscopy :

Vision $\bar{c}$ + 12 D. sph. ⌓ + 1 D. cyl. axis 170° = $\frac{6}{9}$.

$\bar{c}$ +16 D. sph. ⌓ +1 D. cyl. axis 170° = J. 1 at 12″.

Remarks.—The chief points of interest in this case are :

1. The failure to lacerate the lens capsule at the first operation. There was no question as to the sharpness of the needle, as shown by the ease with which the cornea was perforated.

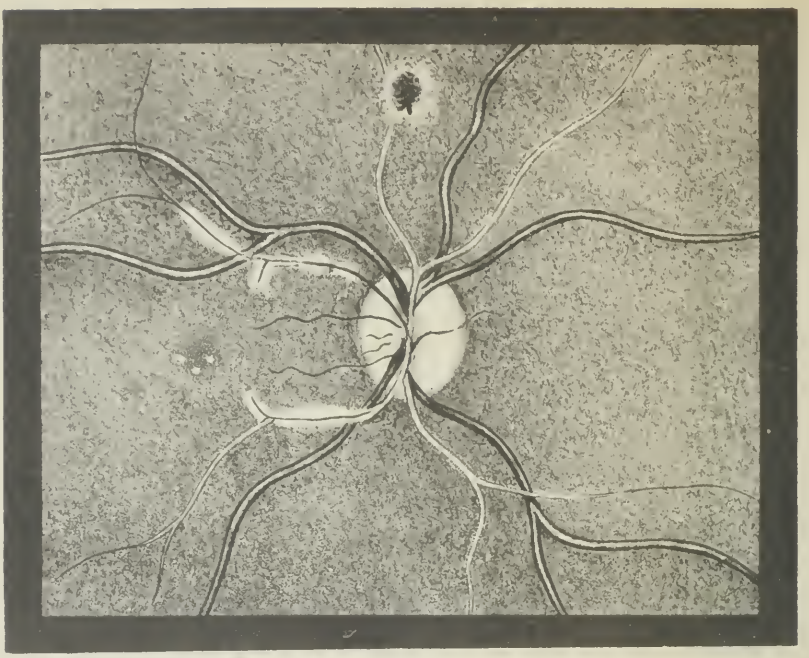
2. The large amount of lenticular myopia present in the right eye. The refraction of the aphakic left eye shows a probability of axial hypermetropia in the right eye.

(*Card specimen. December 14th,* 1899.)

The Chairman (Mr. A. Q. Silcock) said it seemed a very successful case, but somewhat unusual from a clinical point of view. He had had few opportunities of dealing with cases of congenital subluxation; the last one on which he operated upon he needled, and gradually got complete absorption of the lens. In that case, however, the lens was not displaced into the anterior chamber. He supposed needling was the usual practice in such cases, but it would be interesting to hear the experience of members of the Society.

Mr. Holmes Spicer asked how the Chairman fixed the lens in his case. It seemed to him (Mr. Spicer) that the difficulty in dealing with such cases was that the lens moved in front of the needle. In some cases of full-sized congenital cataracts it was very difficult to introduce the needle if the capsule was thickened; the difficulty was still greater in ectopia lentis, as the lens easily moved in front of the needle, and was dislocated still further back by the attempt at needling. He would like to know if the Chairman fixed the lens first. It had been recommended that the needle should be passed through the sclerotic before dealing with the lens.

The Chairman (Mr. A. Q. Silcock), in reply to Mr. Spicer, said the circumference of the lens in the last case he had operated on was practically in the centre of the pupillary area, and, as fortune would have it, the capsule was not particularly dense; at all events he had no difficulty in inserting a very fine needle. The lens subsequently became rapidly opaque and was absorbed. He was prepared at that particular operation to fix the lens from behind with a second needle, and he did not think he would have had any hesitation in doing so if the capsule had been tough or resistent.



F. E. Jessop, del.

Fig. 1.

M. B. Taylor, *del.*

Fig. 2.

Bale & Danielsson, Ltd., Lith.

PLATE VI.

Fig. 1 illustrates the Ophthalmoscopic Appearances of the Right Eye in Mr. Jessop's case of Occlusion of the Central Retinal Artery in each Eye (p. 98).

Fig. 2 illustrates Mr. H. Work Dodd's case of Opaque Nerve-fibres (p. 181).

3. *Opaque nerve-fibres.*

By H. Work Dodd.

(With Plate VI, fig. 2.)

A deaf and dumb girl æt. 13.

Right eye.—Running inwards from the disc is a wisp of opaque nerve-fibres following the course of a vessel. The patch is separated from the disc, which latter shows some faint striations of nerve-fibres (opaque) at its borders.

(*Card specimen. November 9th*, 1899.)

Mr. Treacher Collins said he had a case similar to the one Mr. Dodd had shown under his care at Moorfields. The patient had an isolated patch of opaque nerve-fibres in the upper and outer part of the fundus, and there were no opaque nerve-fibres in connection with the disc itself. The patch had the characteristic feathered edge. Some opacity was present in front of the retinal vessels. He had had the case under observation for nearly a year without any change being manifest, therefore he thought there could be no doubt about the diagnosis.

Mr. Sydney Stephenson said he published a case some years ago* in the 'Archives of Ophthalmology,' in which an isolated patch of opaque nerve-fibres was present in a peripheral portion of the fundus of one eye. There were no opaque nerve-fibres around the optic disc.

* 'Archiv. of Ophthalmology,' vol. xxvi, 1897, p. 241.

4. *Two cases of opaque nerve-fibres in retina.*

By E. Nettleship.

(With Plate VII.)

In the two cases described below, one eye of each patient showed a single large area of opaque nerve-fibres in the retina at a considerable distance from the disc, the disc itself being quite free. The condition in each case is probably congenital; but it is partly because there is, at least in Case 1, some doubt on this point that I have brought the subject before this Society.

In Case 1 double optic neuritis, believed to be due to cerebral tumour, was present when the retinal patch was first observed (Plate VII, fig. 1). When the nerve, and with it the nerve-fibre layer of the retina, afterwards passed into atrophy, the opaque nerve-fibres almost disappeared (Plate VII, fig. 2). This phenomenon could not be taken as proving the nature of the original patch; for if the patch had been inflammatory its absorption would be expected when atrophy ensued, whilst if congenital the disappearance of the white substance of Schwann would in similar circumstances not be surprising. Therefore, although the opaque patch was unlike anything commonly met with in cases of optic neuritis or neuro-retinitis, its interpretation remained in some doubt. Mr. Work Dodd showed a patient, at the meeting on November 9th last year, with an almost exactly similar patch in a healthy eye; and at the same meeting Mr. Treacher Collins and Mr. Stephenson each mentioned a similar case. I have also quite lately seen a similar area of opacity in the retina of a healthy eye (Case 2). These cases increase the probability that the condition in my Case 1 was congenital.

It does not seem probable that such congenitally opaque nerve-fibres are common in the retina, the disc being free; and so far as I know Mr. Dodd's drawing is the first that has been shown. However this may be it will be interesting to hear whether optic atrophy is known to be followed by the disappearance of congenitally opaque nerve-fibres, either when they involve the disc in the usual manner or when lying in the retina.

Case 1.—James H—, æt. 25 (T., I.P., 1885), a healthy country gardener, came to Moorfields Hospital on *October 17th*, 1885, for slight defect of sight and occasional very brief attacks of total blindness. V. was $\frac{6}{6}$ and 2 J. with R.; $\frac{6}{9}$ and 4 J. with L.; refraction about 1 D. of H. Examination showed well-marked double papillitis with steep swelling, some hæmorrhages, and white streaky patches; the veins engorged, but no œdema beyond the limits of the disc; no further details were noted on this occasion.

Family and personal history good; no history pointing to syphilis. There had for some weeks been a little discharge from, and slight deafness of right ear.

His symptoms had begun about four months previously, when an attack of giddiness, faintness, and headache came on as he was mowing grass one hot afternoon in June. He managed to keep at work for two or three weeks, when he had to be in bed for some days with headache and sickness. He then resumed work and kept at it, though partly disabled by headaches and vomiting, till he came to the hospital. During all this time the sight was slightly confused, and he seems at times to have had double vision.

Soon after coming to Moorfields he was admitted under the care of the late Dr. Bristowe at St. Thomas's Hospital on the supposition that he probably had cerebral tumour. There, on *December 1st*, I made the following note:—"In the nasal part of the R. retina is a large, fan-shaped, opaque area, presenting exactly the characters of

a patch of congenitally opaque nerve-fibres, but separated by a considerable clear interval from the optic disc; at the base of the swollen disc are two small hæmorrhages. In L. eye no hæmorrhages and no opaque nerve-fibres.

A few days later Mr. Lapidge made a drawing of the R. fundus (Plate VII, fig. 1).

Twelve months later (*Dec. 2nd*, 1886) V. was still $\frac{6}{9}$ with each eye, though the discs, no less swollen than before, were becoming grey, and the hæmorrhages had disappeared.

On *April 14th*, 1887 (sixteen months after the drawing), Mr. Lawford noted that the retinal patch was decidedly less apparent, and in *November* (nearly two years) it could be found only by careful inspection as a fine parallel striation, the "tail" or point of the patch being still well separated from the disc. V. had now sunk to fingers in this (R.) eye, and $\frac{6}{18}$ in the L.; the discs though still swollen (4 or 5 D.) were much paler and less hazy.

June, 1888.—R. V. only hand movement. L. V. $\frac{6}{9}$ with nearly full field.

October, 1888 (nearly three years after the first drawing).—A second drawing (Plate VII, fig. 2) made by Mr. Head, showed only a trace of the opacity. Discs still swollen and hazy, though pale; arteries of fair size. R. V. hand movement; pupil of ordinary size; direct action to light prompt, though of small range. V. of L. still varies, but is much worse than at last note; size and activity of pupil not sensibly different from R.

July, 1893.—Now bare p.l. with both eyes; discs very white and nearly clear, but still swollen about 2 D.

January, 1900 (more than fourteen years).—His wife writes that the patient keeps well, but is still liable to headache, chiefly over right ear.

He has all along remained liable to spells of headache, and once had some "fits." He has been an in-patient at St. Thomas's Hospital several times, latterly under Dr. Sharkey's care, but I believe no precise diagnosis has been made.

PLATE VII.

Illustrates Mr. Nettleship's paper, Note on Opaque Nerve-fibres of the Retina (p. 182).

The Plate shows a large area of opaque nerve-fibres in the retina at a distance from the disc in Case 1, when optic neuritis was present; and the almost entire disappearance of the opacity when the nerve became atrophied.

The original drawings were not both made by the same artist, and to this must be ascribed some of the minor topographical differences between the two figures.

FIG. 1.—Papillitis with steep swelling, two hæmorrhages, and a large fan-shaped area of opaque retinal fibres at a distance from the disc. December, 1885.

FIG. 2.—From the same eye when blind from consecutive atrophy. The retinal opacity has almost disappeared. October, 1888.

M. H. Lapidge, del.

Fig. 1.

A. W. Head, *del.*

Fig. 2.

Bale & Danielsson, Ltd., Lith.

Case 2 was that of a male æt. 54 (reference P. 51, 213), who came for advice about spectacles in November, 1899. He seemed to be quite healthy but was overworked.

V. with his slight H.As. corrected was $\frac{6}{6}$ with each eye, and the appearances were normal except in the two following particulars :

At the L. fundus was a long tract of opaque nerve-fibres beginning at least a disc breadth from the disc, and extending thence up and out above and far beyond the yellow spot; it was shaped like a slightly opened fan with the narrow end towards the disc. The opacity, nowhere very intense, was least so at the narrow or proximal end, but its striation was exactly like that of ordinary opaque nerve-fibres. In the R. there was no opacity, but the upper temporal artery (the vessel corresponding in this eye to the opaque fibres in the other) showed several apparent variations of size, and was smallest of all on the disc; its central streak, however, was not bright, and I could see no changes in its walls.

(*May 3rd*, 1900.)

Mr. Adams Frost said he saw at the Royal Westminster Ophthalmic Hospital a case of glaucoma simplex in one eye, and in the other eye opaque nerve-fibres. The patient brought with him an old paper of Mr. Juler's, from which it appeared that a note had been carefully taken, showing that four years previously there were opaque nerve-fibes in both eyes, the discs being otherwise normal. It seemed clear that owing to the atrophy of nerve produced by the glaucoma the opaque nerves had disappeared in that case. There was also another case on record of the disappearance of opaque nerve-fibres as the result of atrophy, recorded by Wagenmann ('Archiv für Ophth.,' Bd. xl, Ab. iv, t. 256).

P.S.—When the above was written I had not referred to Wagenmann's case, published in 1894 ('Archiv für Ophth.,' Bd. xl), and referred to in Frost's 'Atlas.'

In Wagenmann's case a man æt. 57, with incipient tabes, came under care for optic atrophy in May, 1888. The R. eye was far gone (19 J.). The L. had about $\frac{1}{2}$ normal V., could read 3 J., and showed no loss of F., though there was already some colour blindness; from the O.D., which was decidedly pale, a sector of opaque nerve-fibres of ordinary appearance passed downwards and outwards. Three months later (August), though V. of L. had sunk to about $\frac{1}{3}$, there was no alteration in the appearances. In ten months (March, 1899) V. of L. was only $\frac{1}{10}$ and words of 14 J.), and there was *qualitative* loss of F. at inner part; the O.D. was greyish, the arteries narrowed, and the sector of opaque nerve-fibres had disappeared. When next seen, a few months later, the upper inner sector of the F. (corresponding to the situation of the previously opaque fibres) had become *totally* blind. Finally both eyes became blind. The author draws attention to the correspondence just mentioned between the situation of the opaque fibres and the loss of field, and thinks it proves that the function of the nerve-fibres was lowered before any change was visible in their appearance, but that they were not totally destroyed until some time after the opacity had entirely disappeared; and he concludes that the morbid process probably began at or near the head of the nerve, not in the trunk far behind the eye.

P.P.S.—The disappearance of congenitally opaque retinal nerve-fibres in atrophy of the optic nerve was, I find, proved experimentally by Pflüger in 1880.

In examining the eyes of rabbits in which he had many months previously ligatured the optico-ciliary bundle he observed, in addition to optic atrophy and other changes, that the bands of opaque retinal fibres, normal in the rabbit, had completely disappeared ('Trans. Sixth Internatl. Ophth. Congress,' Milan, 1880, p. 48).

5. *Vascularity of lens capsule, probably congenital.*

By W. A. Brailey and A. W. Ormond.

O. C—, æt. 2½. This patient was seen at Guy's Hospital on August 13th, 1899.

The following history was obtained. The doctor who attended the mother at the birth of this child remarked that there was something abnormal about the right eye, and the mother noticed that it was "bloodshot."

When the child was one year old attention was again drawn to the condition of the eyes, owing to his developing an occasional squint. During the month of June Dr. Cobb, of Tooting, saw the child and sent it to the hospital.

Condition noticed in August, 1889:—Opacity in lens situated in the anterior part and occupying the inner two thirds. The outer third is almost clear, some small scattered opacities being noticed. On the innermost part of the opaque area are seen several small vessels with minute branches.

The opacity is chalky-white in parts, and has an uneven surface.

The pupil is eccentric, the iris being broader at the outer than the inner side, and the pupil dilates only moderately with atropine.

It was seen last during January of this year, and had undergone no change.

It is probably a congenital cataract, and its main interest lies in the fact of its being vascular.

(*Card specimen. December 4th*, 1899.)

6. *Vestigial hyaloid artery starting from a macular coloboma.*

By A. Quarry Silcock.

(With Plate VIII.)

Lily M—, æt. 16, came to Moorfields complaining of short sight, and wanting glasses. The vision was R. $\frac{6}{36}$.

After atropine an ophthalmoscopic examination was made by Mr. T. Phillips, who found the condition of things in the left eye shown in Plate VIII.

There is a circular macular choroidal coloboma, the fundus being otherwise physiological. From the centre of the coloboma a connective tissue thread-like branch extends forwards through the vitreous, terminating in a fimbriated extremity; the latter is attached by a thin strand of connective tissue to the posterior surface of the lens capsule at the lower and inner part. (Compare a case of macular coloboma by Beaumont, 'Trans. Ophth. Soc.,' vol. xi, p. 221.)

(*Card specimen. January 25th*, 1900.)

7. *Case of macular coloboma associated with old choroiditis.*

By W. T. Lister.

(With Plate IX.)

Geo. P—, æt. 19. Occupation, clerk. Complains of defective sight. He says his sight has always been poor, and that it is not worse lately.

Family and past history.—He is the youngest of a

PLATE VIII.

Illustrates Mr. A. Quarry Silcock's Case of Vestigial Hyaloid Artery starting from a Macular Coloboma (p. 188).

Fig. 1 shows the cord of connective tissue terminating in a fimbriated extremity, which is attached to the posterior capsule of the lens, as seen by direct examination of the anterior portion of the vitreous. A segment of the lower and inner portion of the iris is not drawn, in order to show the direction and form of the anterior extremity of the connective-tissue cord.

Fig. 2 shows the macular coloboma and the posterior portion of the connective-tissue cord representing the hyaloid artery, starting forwards from a point near its centre.

Fig. 1.

M. H. Brooks, *del.*

Fig. 2.

Bale & Danielsson, Ltd., Chromo-Lith.

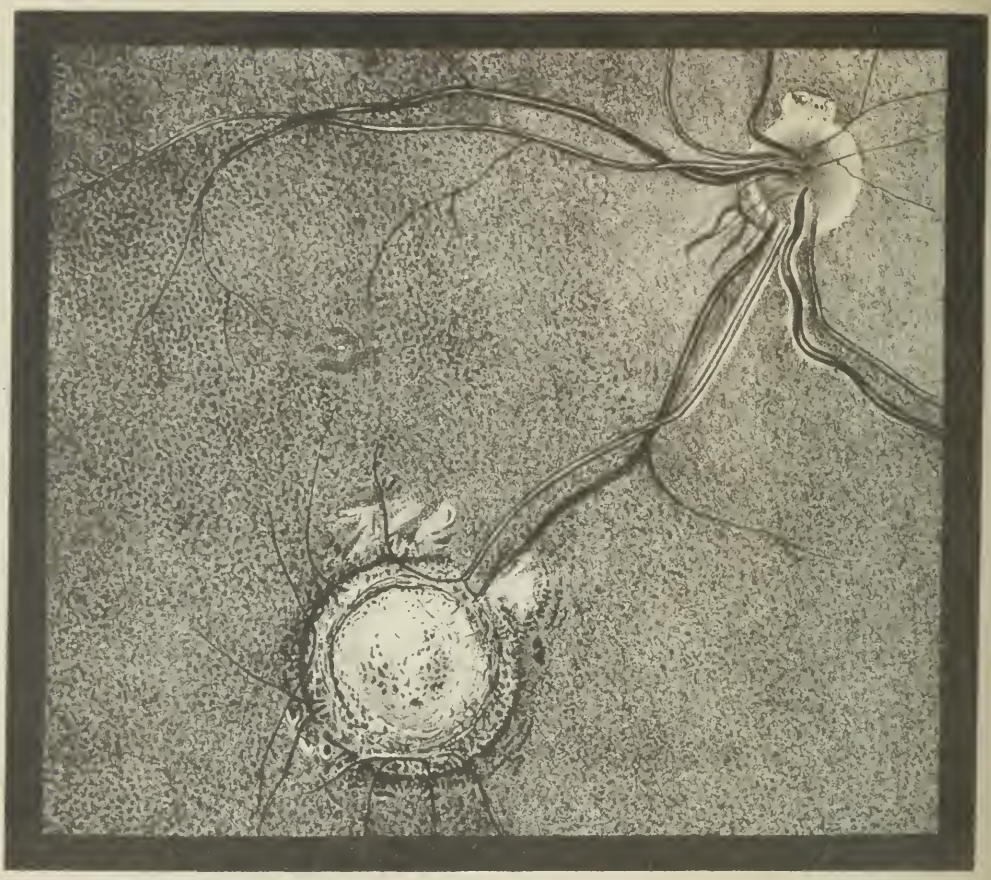


Fig. 1.

M. H. Brooks, *del.*

Fig. 2.

Bale & Danielsson, Ltd., Lith.

PLATE IX.

Illustrates Mr. W. T. Lister's case of Macular Coloboma associated with old Choroiditis (p. 188).

Fig. 1.—Ophthalmoscopical appearances of right eye.

Fig. 2.—Ophthalmoscopical appearances of left eye.

family of four, all of whom are living and well. His mother is alive; his father died from "paralysis." His mother says he was very delicate as a baby. He had whooping-cough when three months old; suffered from rickets; and when twelve months old the doctor said he had "water on the brain." There is no history of fits, nor is there anything in the family history pointing to hereditary syphilis, nor has he acquired any bad disorder. There is no history suggestive of tubercle in the family.

Present state.—There is left convergent strabismus. Nystagmoid movements more marked in left than right.

R. V. $\frac{6}{18}$ $\bar{c}$ sph. $-$ 1 D. $= \frac{6}{9}$.

L. V. counts fingers at 1 yard, not improved.

Right fundus.—The disc is pale, slightly raised, its edges are indistinct, and there is some disturbance of choroidal pigment around. The vessels, and especially the veins, are narrowed as they pass into the disc, and white lines can be seen running along their sides near the disc. Downwards and outwards from the disc is a large white patch, nearly circular in shape, slightly raised, and showing some pigmentation in the periphery. Some retinal vessels appear to pass underneath it and to emerge on the opposite side (Plate IX, fig. 1).

Left fundus.—At the macular region there is a large, sharply defined, oval area, dark in the centre, and white at the periphery. The latter is divided by pigmented bands, which pass from the centre to the margin. The centre, which apparently consists of altered and pigmented retina, and the pigmented bands are on the same level as the surrounding retina, whereas the peripheral white areas are deeply depressed. Choroidal vessels can be seen coursing over the depressed white portion, but they apparently do not communicate with the retinal vessels. Below the disc there is a small crescent with some disturbance of the choroidal and retinal pigment around (Plate IX, fig. 2).

(*Card specimen. May 3rd*, 1900.)

8. *Case with symmetrical congenital notches in the outer part of each lower lid and defective development of the malar bones.*

By E. Treacher Collins.

(With Plate X.)

John McL—, æt. 8, was brought to the Moorfields Hospital on April 23rd, 1900, on account of an attack of catarrhal ophthalmia. On examination it was noticed that there was a shallow notch in the margin of each lower lid, a short distance from the external canthus, the one on the right side being rather more pronounced than that on the left. In direction they tend to slope downwards and outwards. Their appearance suggests, at first, an inaccurately united wound across the edge of the lid; no history of injury is, however, to be obtained. The mother states that they have been present since birth, and attributes them to a fright she received, while pregnant, from a rat which had something wrong with its eyes.

No instruments were used at the birth of the child.

Below each of the eyes there is an unusual want of prominence of the malar bones. No other congenital defect is to be noted either in the child's face or elsewhere.

The patient is one of ten children, eight of whom are living. No other member of the family is known to present any similar defect.

The case differs from the colobomata of the lower lid which have been recorded, due to failure in the closure of the facial cleft, between the fronto-nasal plate and the maxillary processes, in that the notches are situated in the outer part of the lids and slope downwards and outwards, instead of downwards and inwards.

It resembles, however, two cases (mother and daughter)

PLATE X.

Illustrates Mr. E. Treacher Collins' case with Symmetrical Notches in the Outer Part of each Lower Lid, and Defective Development of the Malar Bones (p. 190).

Bale & Danielsson, Ltd

described and pictured by Mr. Berry in the 'Royal London Ophthalmic Hospital Reports,' vol. xii, p. 253, in each of which there was a symmetrical defect of the lower lids of about the same extent and in the same position.

(*Card specimen. May 3rd,* 1900.)

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9. *Case with symmetrical congenital notches in the outer part of each lower lid and defective development of the malar bones.*

By E. Treacher Collins.

Alfred B—, æt. 34, states that the eyelids of his left eye have been in their present condition since birth.

His right lower lid was injured by a piece of broken cup, and partially destroyed, when he was twelve years old.

There is a marked want of prominence of the malar bone on each side, so that each cheek, beneath the eye, appears sunken.

The palpebral aperture on the left side is narrow laterally, measuring only 21 mm. from the external to the internal canthus. In the margin of the lower lid a short distance from the external canthus is a shallow notch, the direction of which inclines downwards and outwards. No abnormality is to be seen in the left eyeball.

The central part of the right lower lid has been destroyed as the result of the injury. There is a cicatrix in it which has caused some entropion of its outer part; when this is everted there is seen to be a shallow notch in its margin symmetrical with that on the other side.

When the right eye is closed, on account of the traumatic defect in the lower lid, the eyeball is not completely covered. There is an opacity of the lower part of the cornea and some injection of the ocular conjunctiva below it.

Remarks.—This case presents the same symmetrical

defect of the lower lids, and the want of prominence of the malar bones, as the boy shown by me at a meeting of the Society last May.

The defect in the lids is similar to that described and pictured by Mr. Berry in two cases (mother and daughter) in the 'Royal London Ophthalmic Hospital Reports,' vol. xii. In neither of his cases is any unusual flattening of the cheeks mentioned.

(*Card specimen. July 6th,* 1900.)

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10. *Congenital aniridia and displacement of lenses with glaucoma.*

By Rayner D. Batten.

A. F—, æt. 21, female. No trace of iris can be seen in either eye. The lenses are displaced upwards, and only the lower half of each lens can be seen; the right lens is opaque, the left partially so.

Right eye T. + 1, no p.l. Slight haze of cornea. The fundus can be fairly well seen; the optic disc is pale. The condition of the fundus does not account for the total absence of vision.

Left eye T. + 2, p.l. There is superficial keratitis, probably secondary to the glaucoma, and no view can be obtained of the fundus. The sclerotic is thinned and staphylomatous.

The patient has never seen with the right eye, but could see to go about with the left eye until the age of thirteen.

She has four brothers and sisters; no family history of congenital defects.

No evidence of hereditary syphilis.

Can anything be done for the relief of the glaucoma in the left eye? (*Card specimen. May 3rd,* 1900.)

11. *Congenital pedunculated dermoid of conjunctiva.*

By Simeon Snell.

(With Plate I, fig. 2.)

Harold R—, æt. 5 months, was brought by his mother to me at the Royal Infirmary early in January, 1900, in consequence of a peculiar condition of the left eye, which had existed since birth. On looking at the child a tumour was at once noticed hanging between the eyelids, and falling over the lower eyelid at about the outer third. The lower part of the growth was enlarged into a rounded ball something about the size of a small pea. It was clearly made out that this pedunculated growth was springing from the ocular conjunctiva, but a complete examination was deferred until an anæsthetic was administered for its removal. The mother asserted that the condition had existed at the child's birth and had remained unaltered since.

On January 22nd chloroform was administered, and it was then found that the pedicle somewhat broadened out at its attachment to the conjunctiva at about halfway between the corneal margin and the inner canthus and rather above the level of the upper edge of the cornea. It was not attached to the sclerotic but was freely moveable. The stalk, as it lay in its natural position, measured half an inch, but traction readily lengthened it to one inch. The summit of the growth was rounded, hard, and about the size of a pea, and the junction of the narrow pedicle to this head suggested much the appearance of the union of the head of a tadpole to its body. This rounded end had no hairs distinctly visible on it, was smooth and apparently well covered with epithelium. The growth was snipped off with scissors, and the edges

of the conjunctival wound were united with sutures. The patient was discharged on January 29th.

Mr. Treacher Collins kindly undertook an examination of the papilloma for me. I append his report.

Report by E. Treacher Collins on the growth removed from the conjunctiva.

The growth consists of a pedicle with a rounded nodule attached to it. The pedicle measures 10 mm. in length, and 5 mm. transversely at the place where it has been cut through, from there it tapers down to its point of attachment with the terminal nodule. This latter measures 7 mm. antero-posteriorly, and 7 mm. in one lateral diameter, 5 mm. in the other.

Microscopical sections of the growth show it to present all the characters of a piece of skin. It is covered externally by laminated epithelium, the surface cells of which are devoid of nuclei, dry and scaly. Beneath the laminated epithelium the substance of the growth is composed of loose fibrous tissue and a small amount of adipose tissue. Amongst the bundles of fibrous tissue numerous sudoriferous glands are seen cut in various directions, and also, in the terminal part, a few hair follicles. In the pedicle there are several sebaceous glands. Transverse sections of the pedicle show some large blood-channels in its centre; these break up into numerous branches in the fibrous tissue composing the rounded extremity.

(*March 20th*, 1900.)

X. INJURIES OF THE EYE.

1. *Extensive scleral wound in ciliary region; suture; recovery.*

By A. Q. Silcock and G. W. Maynard.

Gertrude A—, æt. 13, was admitted (July 29th, 1899) to the Royal London Ophthalmic Hospital with severe injury to both eyes, caused by the bursting of a bottle containing sherbet and water.

Condition on admission.—Right eye: A long vertical wound of sclera in the ciliary region to the inner side, with vitreous and ciliary body presenting in wound.

Left eye: Oblique wound of cornea and iris at the lower corneal border; iris prolapsed.

The scleral wound of the right eye was closed by two fine silk sutures, which were not passed through the whole thickness of the sclera. Lid also sutured.

Iridectomy of prolapsed iris in the left.

August 9th.—Patient was seen, and Gutt. Atrop. gr. ij to ℥j ordered.

September 9th.—R. V. $= \frac{6}{36}$ $\bar{c}$ 1 D. $= \frac{6}{24}$.

L. V. $= \frac{6}{9}$ partly.

22nd.—R. V. $= \frac{6}{18}$ (one letter). $\frac{-\cdot 75 \text{ sph.}}{-1 \text{ D cyl.}} = \frac{6}{12}$.

L. V. $= \frac{6}{6}$ (five letters).

29th.—No fundus change in either eye. Extreme periphery of lens can be seen in right eye as a thin grey line. In left eye margin of lens is seen opposite coloboma.

December 12th.—A scar can be seen on the sclera to inner side of right eye. Fundus normal in both eyes.

Left eye pupil is eccentric, and coloboma due to iridectomy. Fundus normal.

R. V. = $\bar{c}$ correction $\frac{6}{12}$ and 1 J.

L. V. = $\frac{6}{6}$ and 1 J.

(*Card specimen. December 14th*, 1899.)

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2. *Unusual changes in the macular region (? the result of injury).*

By E. Treacher Collins.

(With Plate XI, fig. 1.)

History.—Albert E—, æt. 16, came to the Moorfields Hospital on February 26th, 1900, complaining of difficulty in seeing near work and defect of vision in his left eye; he does not remember the sight of it ever being any different to what it is at present. On being questioned as to any injury, he is able to recall being hit with a stone on one of his eyes (he is unable to say which) about six years ago. He says the blow did not cause any discoloration of the eyelids; he does not know if the sight of his left eye was in any way affected by it. General health good.

Vision.—R. $\frac{6}{9}$ under homatropine with

$$\frac{+ 4 \text{ sph.}}{+ 1 \text{ cyl. vert.}} \ \frac{6}{6}.$$

L. $\frac{6}{60}$ unimproved by glasses.

Fields of vision for white and colours normal; no central scotoma in left eye.

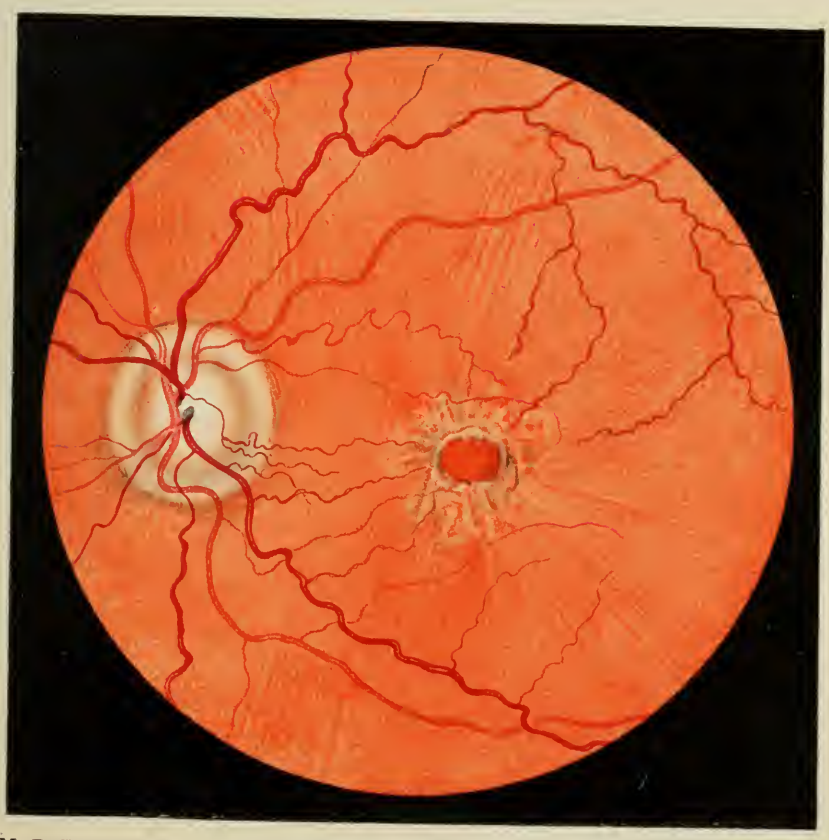
Ophthalmoscopic appearances.—At the macula in the left eye is seen a well-defined, circular, dark red gran-

PLATE XI.

Fig. 1 illustrates Mr. E. Treacher Collins' case of Unusual Changes in the Macular Region (? the result of injury) (p. 196). Case 9 in Mr. F. M. Ogilvie's paper on One of the Results of Concussion Injuries of the Eye ("Holes" at the macula).

Fig. 2 illustrates the Left Eye of Case 12 in Mr. F. Menteith Ogilvie's paper on One of the Results of Concussion Injuries of the Eye ("Holes" at the macula) (p. 202).

Fig. 1.



M. B. Taylor, *del.*

Fig. 2.

Bale & Danielsson, Ltd., Chromo-Lith.

ular area about the size of the optic disc. In it there are some fine minute bright specks. Entirely surrounding the dark red area is a greyish ring, which is broadest down and out; at its inner margin are three bright white shining dots. In the grey area and in the surrounding retina are several scattered small white spots.

Extending forwards into the vitreous chamber from the lower and inner margin of the red area is a small greyish protuberance, the summit of which is best seen with a + 7 D. lens; it is rounded, but appears to have a central dimple. A very delicate grey line can be seen passing from its surface down and in, whilst down and out a small knob-like process projects.

The optic disc and retinal vessels appear healthy. There is a small pigmented spot on the anterior capsule of the lens. Fundus of right eye appears healthy.

Remarks.—The absence of any central scotoma in this case seems definitely to show that the retina is present over the central red area. The position, shape, and size of this latter corresponds to that of the macula lutea, and its unusual red appearance is probably the effect of contrast with the surrounding grey.

The opacity of the retina around the yellow spot may be due to changes in the nerve-fibre layer, which is only represented by a few delicate twigs in the macula itself.

If the changes followed the blow, they may possibly have resulted from a macula hæmorrhage; scattered white spots in the retina are known to be sometimes left in such cases. The little projection from the lower margin of the red area might be a piece of organised blood-clot.

(*Card specimen. March 8th*, 1900.)

3. *Eye changes in a case of bullet wound of head.*

By F. Menteith Ogilvie.

Walter B—, æt. 37. Bicycle agent, etc.

On December 6th, 1899, shot himself with a revolver, a Smith-Wesson ·320, carrying a leaden bullet weighing 88 grains, and a powder charge of 16 grains.

The bullet entered the right temple about half to three quarters of an inch behind the external angular process of the right frontal bone, and did not emerge. According to the patient's own account he never lost consciousness. "The light," as he said, "went out in the right eye" as the shot was fired, and never returned; vision in the left eye became greatly reduced. There was very free bleeding from the nose, and he vomited "great quantities" of blood. He was admitted to the Radcliffe Infirmary under Mr. Symonds.

On the 10th December the patient was seen by Mr. Doyne for the first time. There was then no p.l. in R.E.; blood in the vitreous and anterior chamber, and the T. was — 3.

Mr. Doyne excised the eye at once, thinking the probabilities were in favour of the bullet having penetrated the ocular tunics posteriorly. Examination of the globe after removal proved this was not the case. There was some evidence of bruising at one spot, but no perforation, nor did the optic nerve appear to have been divided by the bullet.

L.V. $\frac{6}{36}$, Hm. $2=\frac{6}{36}$ (will not tolerate higher + lens). A wedge-shaped piece seems lost out of any object he fixes. T.n. P.n.

Ophthalmoscopic examination.—L. E. media clear. O. D. vessels and fundus elsewhere than the macular region normal.

At the macula is a slightly irregular oval area, quite sharply defined, and having the appearance of a punched-out hole, as though the retina in this situation had been

removed with a trephine. "The floor," that is the bottom of the hole, is deep red in colour, and slightly mottled or granular in appearance. Situated on the floor are five soft whitish spots, which give one the idea of being slightly raised. Some points of cholesterine are also seen.

The edges are hard, sharp, and white; they are particularly well defined down and out. The floor is best seen with + 3 D., and the edge with + 5 D. or + 5·5 D.

Parallactic movements obtained between "the floor" and the edge. The retina in the immediate neighbourhood of "the hole" is greyish and sodden looking, as if from œdema.

Special senses.—Hearing, smell, taste unaffected.

On January 12th, 1900, he was admitted into the Oxford Eye Hospital, and remained under our care until April 9th, 1900. The notes for this period are shortly summarised.

The vision of the L. E. improved to $\frac{6}{24}$ ("comes and goes;" not further improved with glasses). 4 J. fairly; letters of 2 J.

He complains of the letters being all "anyways" (*i. e.* crooked and broken), and occasionally "losing them in a patch." Oddly enough he writes his own letters without much difficulty, and manages to read those letters that he receives without aid. Written letters are easier to him than printed ones. Vertical lines (*e. g.* window sashes) appear bent in the centre, with the convexity inwards.

Field for white full, but white 2 mm. square reveals a small absolute central scotoma.

The ophthalmoscopic appearances remained almost entirely unchanged during his stay in the hospital.

As the situation of the bullet was entirely unknown, and was of great importance in forming any sound judgment on the case, I asked Dr. Mackenzie Davidson if he would mind seeing the patient and skiagraphing

him for me. The result is shown in the beautiful series of skiagrams exhibited this evening, and I should like to take this opportunity of thanking him for his kindness, and for the time, trouble, and skill he so generously expended on this case. The bullet has been localised with absolute exactitude, lying in the left orbit, almost in contact with the posterior and inner side of the left eyeball, and above the optic nerve. The stereoscopic skiagrams show the deformed bullet in its actual position, with a considerable amount of lead *débris* in its track.

This case is of interest for two reasons; firstly, the curious central lesion which the remaining eye presents—the appearance of a "hole at the macula" as though this part of the retina had been bodily removed in some way or another; and secondly, the wonderfully fortunate course the bullet has taken, and the comparatively small damage which it has effected in its passage.

Concerning the first of these points I do not propose to say anything to-night. Several cases, apparently of a similar nature, as regards the retinal appearance, have been shown before the Society recently, and I have now gathered together something over a dozen of these central "holes," which form the subject of a paper I hope to be permitted to read before the close of the present session.

Concerning the path of the bullet, the scar of entry is plainly evident at present; had the bullet kept on its course the exit wound would have been at a very nearly corresponding point of the left temple, the direction being nearly perfectly transverse with the long axis of the skull.

It entered the right temporal fossa; then passed through the sphenoid close to the spheno-malar suture, through the right orbit, without perforating the right eyeball or severing the optic nerve; then through the posterior ethmoidal cells, possibly opening the sphenoidal sinus at the same time; then through the back part of the highest meatus of the nose, through the left posterior ethmoidal cells, and so into the left orbit, where it comes to rest

against the posterior and inner side of the left eyeball. But for the central lesion the eye seems to have escaped entirely. The pupil and tension were normal from the first. There was no proptosis or impairment of the movements of the eyeballs at any time, and such pain as he had was referred rather to the left temple than the left eye. Had the course of the bullet been slightly more anterior, both eyeballs must, one would think, have been perforated, and the olfactory nerve greatly damaged; while if the direction had been slightly upwards as well as transverse the bullet would probably have come to rest in the frontal lobe of the cerebrum. In fact, there is, I think, no conceivable path the bullet could have taken which would lead to less damage, and a skilled surgical anatomist would have some difficulty in intentionally making a missile travel the same course with as little injury to the well-being of the individual.

(*Card specimen. May 3rd*, 1900.)

Mr. Nettleship said he saw an officer a few days ago from South Africa who was in, he thought, the Pieter's Hill battle. He had been wounded by a Mauser bullet, which entered at the junction of the left malar and superior maxillary bones, and came out just over the articulation of the jaw on the same side. The eye was blind, but there was no reason to believe that the eyeball was wounded. The course of the bullet appeared to have been such that it would not touch the eyeball, or at any rate the optic nerve. He had extensive scar changes in his retina and choroid, which, in a rough way, corresponded to the situation of the bullet; the optic disc was palish, but the *total* blindness was not accounted for by the ophthalmoscopic appearances. He presumed the optic nerve must have been damaged, perhaps by extensive bleeding into its sheath. He did not think the lesions caused in such cases had been fully explained. Some similar cases had been published after the Franco-German war, and he thought also after the American war, in which bullet

wounds of the orbit led to intra-ocular changes without any external wound of the eye. They had been spoken of as "indirect" gunshot injuries. He supposed that in the case he mentioned it was possible that the total blindness was due not so much to the lesions one saw in the retina and choroid, but possibly to the very extensive hæmorrhage into the sheath of the optic nerve. In addition he mentioned having seen three cases similar in essentials to Mr. Ogilvie's case.

The PRESIDENT said a few weeks ago he saw a young officer who was wounded at Magersfontein. The bullet entered at the frontal-parietal suture, took a downward course, and emerged through the lower jaw, taking out two teeth. There was just perception of shadows in the left eye; the optic disc was atrophied, and he had also lost the sense of smell, but apart from the atrophy of the disc there was nothing unusual in the fundus. The exceptional circumstance of the case was that the man never for a moment lost consciousness, and he made an uninterrupted and rapid recovery. Probably many of them would see such cases from time to time.

Mr. JOHNSON TAYLOR said that a few years ago he had a case in which a man was shot in the right occipital region by a pistol bullet. A portion of his brain escaped through the wound. His skull was trephined and some more brain tissue was lost. He was very ill for a long time, but ultimately completely recovered, with the exception of having left lateral hemianopsia. He did not lose any other of his special senses, nor any of his powers.

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4. *On one of the results of concussion injuries of the eye. ("Holes" at the macula.)*

By F. MENTEITH OGILVIE.

(With Plates XI, XII, XIII, and XIV.)

CONCUSSIONS of the eye may produce almost any conceivable injury to any or all the different parts of the

eye, from rupture of the globe to a small corneal abrasion, or the most trivial and temporary disturbance of vision.

There are, however, a special class of cases belonging to this group which, as it seems to me, have never been brought together and considered in their concrete relationship, nor received the attention which their clinical and pathological importance deserve. I refer to certain definite lesions, mainly confined to the retina in the region of the macula, resulting from violent concussions of the eye with some blunt instrument, as, for instance, a stone, a tennis or cricket ball, a pellet of shot from a catapult. The retinal lesion in a typical case is very distinctive and remarkable. Briefly the characteristics are these : at the macula there is the appearance of a punched-out hole, generally circular or oval in shape, corresponding closely in size to the macula. This area is depressed below the level of the surrounding retina, is deep red in colour, and is quite sharply margined by clean-cut edges.

It is no doubt open to question whether these so-called holes are really in the strict anatomical sense perfect solutions of the retinal continuity, but at any rate for descriptive purposes the term is convenient, and throughout this paper the lesion has been spoken of as "a hole," the deep red area as "the floor," and the clean-cut frame as "the edge."

In every case, so far as can be ascertained, the eyes injured were perfectly healthy before the accident, with no evidence of degenerative change of any kind ; in two only* was there any considerable error of refraction. Sex and age appear to be immaterial, but naturally males, particularly schoolboys, preponderate.

Of these cases I have collected fifteen, five of whom have already been brought before the Society. An important feature, the position of the retina, divides the series into two groups, in one of which the retina is

* Cases 8 and 9.

probably not separated from the choroid, and in the other is obviously detached; but all show the characteristic retinal lesion, viz. a "hole" at the macula.

Ophthalmoscopic drawings have been made of eleven of these cases, and one is already figured in the 'Transactions.' For convenience these have been reproduced on lantern slides, and will be shown on the screen to-night.

As the cases are illustrated, it seems wiser to read the notes referring to them in this part of the paper, in order that the conditions to which I allude may be made clear, and then proceed to attempt an explanation of the physical causes producing the injury, and of the pathology of the fundus as we see it.

Table of Cases.

I.—*Group A. "Hole" at the macula. Retina not obviously detached.*

No.	Name.	—	—	—
1	B. C.	23 m.	Poker	Mr. Hartridge, 'Trans. Ophth. Soc.,' vol. ix, p. 144.
2	David D.	24 m.	Blank cartridge	Mr. Lawford, 'Trans. Ophth. Soc.,' vol. xiii, p. 76.
3	Harold T.	12 m.	Stone	Mr. Marcus Gunn, not published.
4	Chas. B.	28 m.	Cricket ball	Mr. Frost, not published.
5	R. F.	20 m.	Cricket ball	Mr. Lawford, not published.
6	?	?	Tennis ball	Mr. James, Ophth. Soc., Dec. 14th, 1899, "Clinical Evening."
7	Percy B.	13 m.	Small bullet from catapult	Mr. Lang, not published.
8	Walter B.	37 m.	Bullet wound of head	Mr. Doyne, Ophth. Soc., May 3rd, 1900, "Clinical Evening."
9	—	m.	? stone	Mr. T. Collins, Ophth. Soc., March 8th, 1900.
10	Mrs. S. B.	60 f.	?	Mr. Grimsdale, not published.
11	H. M.	38 m.	Fragment of wood	Mr. Donald Gunn, not published.

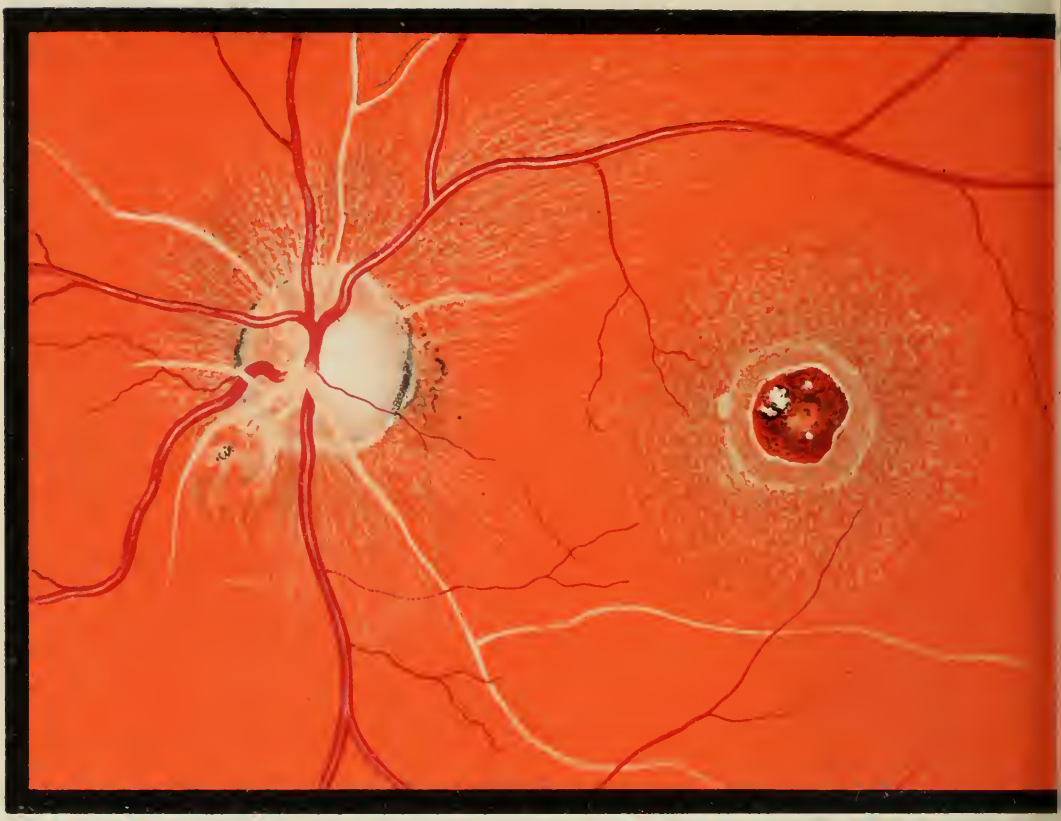


Fig. 1.

A. W. Head, *del.*

Fig. 2.

Bale & Danielsson, Ltd., Chrom

PLATE XII.

Illustrates Mr. F. Menteith Ogilvie's paper on One of the Results of Concussion Injuries of the Eye ("Holes" at the macula) (p. 202).

Fig. 1.—Left eye of Case 3.

Fig. 2.—Left eye of Case 4.

II.—*Group B. "Hole" at macula. Shallow but obvious transparent retinal detachment.*

No.	Name.	—	—	—
12	John W.	53 m.	Stiff twig	Mr. Lawford, not published.
13	Reginald S.	12 m.	Stone	Mr. Marcus Gunn, not published.
14	Charles P.	22 m.	Peg of wood	Mr. Frost, not published.
15	—	16 f.	Cork	Dr. H. D. Noyes, 'Trans. Amer. Ophth. Soc.,' 1871, p. 128.

Case 1.—B. C—, æt. 23, soldier. Shown by Mr. Hartridge, published 'Ophth. Soc. Trans.,' vol. ix, p. 144 (with plate by Mr. Morton).

Case 2.—David D—, æt. 24. Shown by Mr. Lawford, and published 'Ophthal. Soc. Trans.,' vol. xiii, p. 76.

Case 3.—Harold T—, æt. 12, schoolboy. Royal London Ophthalmic Hospital, Moorfields, July 29th, 1896, complaining of defective vision of L. E. for nine months.

History.—He was struck under the L. E. with a stone nine months ago. Much swelling of the lids, etc., followed, and the eye could not be opened for some days. When it was possible to do this patient noticed that the vision of the L. E. was very dim, and that "everything looked red." Gradually the red effect passed away, but the sight remained very defective.

He stated that previous to the accident he could see as well with the left as with the right eye; he had on more than one occasion at school shut first one and then the other eye, and had seen equally well with either.

Present condition.—Bright healthy lad, remarkably intelligent.

R. V. $\frac{6}{6}$, no Hm. 1 J. at 25 cm., ophth. normal.

L. V. Fingers at about 1·5 metre, puzzles out letters of 20 J. L. pupil normal. T. n.

L. E.: Ophth. media clear. O. D. on its temporal side seems a little pale (as compared with R. O. D.), and the margins in and down not very well defined.

At the macula is a nearly circular area, deep red in colour, between half and one third O. D. d. This area is very sharply defined, and is surrounded by a frame of sodden whitish-looking retina, which gradually merges off into the normal fundus. The appearance is such as one might imagine would be caused by punching out the macular region of the retina with a trephine; it is so perfectly limited to the macula, and so clean cut in appearance.

The floor is deep red in colour, contrasting very markedly in this respect with the other parts of the fundus, and is profusely peppered with fine pigment dots. There are one or two small white spots, and up and in a larger spot of (?) degenerated retina situated in the red area, and this area is depressed to the extent of 1·5 D. below the surrounding retina, as evidenced by direct estimation, and by obtaining slight parallactic movements.

The edges, that is the retina immediately surrounding and framing in the red area, are dirty grey in colour, and on the inner side of the frame are two or three soft yellowish spots of altered retina.

Fundus elsewhere normal.

Retinoscopy under atropine.

R. +2 / — +2 L. +2·5 / — +2·5

L.: *Field* for white full—absolute central scotoma.

This patient was under observation for over eighteen months, and the vision and ophthalmoscopic conditions remained practically unaltered (Plate XII, fig. 1).

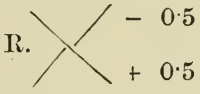
Case 4.—Charles B—, æt. 28, club servant. St. George's Hospital, July 13th, 1898, complaining of failure of left eye for eight days.

History.—Was playing cricket on July 5th and failed to hold a hard return; the ball slipped through his hands and struck him on the left eye. He was knocked down, and was insensible "for about fifteen minutes." On regaining consciousness he found the sight of the left eye practically gone. There was a small cut over left upper lid. Before the accident, he says, the sight was equally good in either eye.

On his first attendance at St. George's the left fundus was not well seen, owing to the condition of the vitreous. There was no hæmorrhage, but a somewhat dense haze throughout, which entirely prevented any detailed examination of the fundus.

The next week the vitreous had largely cleared up, and Mr. Frost noted the appearance at the macula, and most kindly allowed me to make use of the case. The following notes were taken on August 20th, 1898, thirty-eight days after the injury.

Present condition.—R.V.: $\frac{6}{6}$ imperfect; refraction low, mixed astigmatism; ophth. normal.



L.V.: "Fingers" at 0·5 metre. T.n.

Pupil widely dilated and inactive from the first (traumatic mydriasis).

L.E.: Ophth. media practically clear.

O.D.: Good colour; slightly fuzzy on the outer side, margins otherwise well defined.

There are somewhat extensive superficial retino-choroidal changes, with pigmentation between O.D. and macula, becoming more marked as the macula is approached.

At *the macula* is a circular area, red in colour, but not so dark as in Case 3, having, as in that case, a perfectly sharp, clean-cut appearance, as if a trephine had been applied and the macular portion of the retina removed.

"*The floor*" is not a perfectly uniform red, but is

somewhat mottled with spots of a lighter colour; there is no obvious pigment deposit.

"*The edges*" are particularly sharply defined on the outer side, and on the outer border one small crystal of cholesterine is seen.

Between "the edges" and "the floor" there is a difference of 1·5 D. or 2 D. in level.

Periphery of fundus normal.

L.: Field for white full. Well-marked absolute central scotoma for white (Plate XII, fig. 2).

Case 5.—R. F—, æt. (*circa*) 20, labourer. Royal London Ophthalmic Hospital, Moorfields, October, 1898, complaining of failure of right eye.

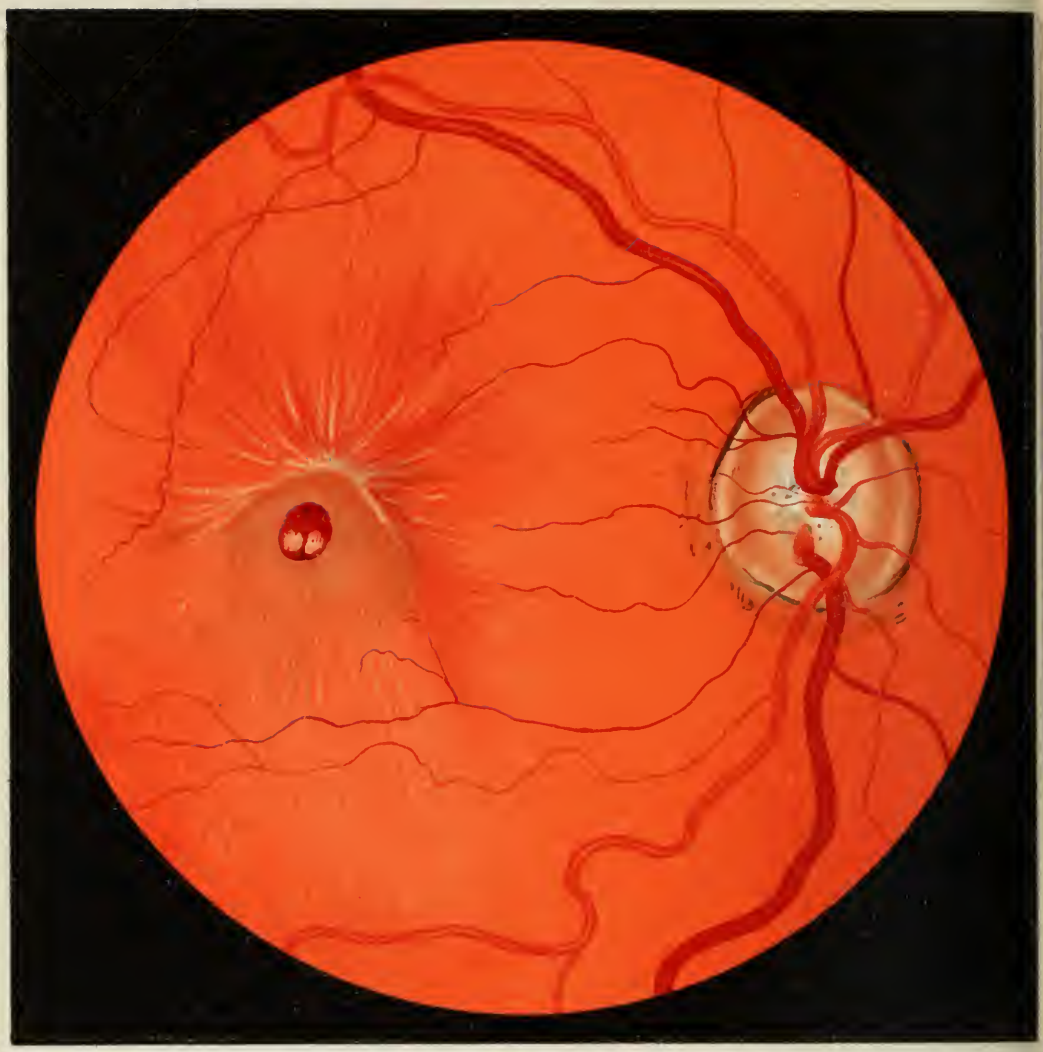
History.—Up to summer of 1898 good vision in both eyes. Playing cricket at that time, received a blow on his right eye from a cricket ball, followed by immediate failure of vision in that eye.

Present condition.—L.V.: $\frac{6}{6}$, "refraction nearly emmetropic."

R.V.: $\frac{6}{36}$ (Mr. Lawford writes, "I do not remember; it was something like 20 per cent.").

Right: Ophth. At the macula is an approximately circular area, looking as if it had been "cut out with a trephine," with "floor" of a deep red colour, speckled with pigment. The "floor" is depressed about 1 D. or 1·5 D. below the edges of the surrounding retina. "The edges" are clear and sharply defined. On the temporal and lower side of "the hole" are seen three circular whitish spots, probably degenerated retina. Nearly directly above "the hole" is a semilunar fold (?) retinal pleat. To the inner side of O. D. is a white streak running obliquely down and out—probably ruptured choroid. The fundus generally with the above exceptions is normal.

The notes in this case are incomplete; the patient has unfortunately been lost sight of. Mr. Lawford verified the notes and furnished a rough pencil sketch (memory)



M. B. Taylor, *del.*

Fig. 1.

A. W. Head, *del.*

Fig. 2.

Bale & Danielsson, Ltd., Chromo-Lith.

PLATE XIII.

Illustrates Mr. F. Menteith Ogilvie's paper on One of the Results of Concussion Injuries of the Eye ("Holes" at the macula) (p. 202).

Fig. 1.—Right eye of Case 7.

Fig. 2.—Right eye of Case 10.

from which the diagram has been drawn. This latter is of course absolutely diagrammatic, and is simply intended to emphasise the salient features in the case.

Case 6.— — —, male, shown by Mr. James at the Society's meeting December 14th, 1899.

Case 7.—Percy B—, æt. 13, schoolboy, consulted Mr. Lang on December 1st, 1899, on account of defective vision of R. E.

History.—Two days previously he had been struck in the R. E. by a small lead bullet from a catapult. The pain was severe, and he fainted; on recovery found he could not see with the R. E. Before the accident he believes he could see equally well with either eye.

Present condition.—R. V. $\frac{5}{36}$ not improved. Refraction H. 2 D.

L. V. $\frac{5}{5}$ Hm. 0·75 D.

Right pupil was under influence of atropine at time of the visit. T.n. Cornea, A.C., and lens normal; slight abrasion of centre of lower lid.

Right ophth.—To the nasal side of O. D. is a patch of white effusion—in the lower periphery of the retina are several small punctate hæmorrhages.

No gross hæmorrhages in vitreous; good view of fundus obtained. The retina in the region of the macula and extending concentrically for a considerable distance from it is milky white and clouded from œdema. At the macula is a nearly circular area, red in colour, and standing out in marked contrast to the grey of the surrounding retina. It has all the appearance of a punched-out hole.

In size it is rather more than $\frac{1}{4}$ O. D. d.; the red floor is crossed by a yellowish white streak of (?) altered retina. Several small crystals of cholesterine are seen, one showing very brilliantly. The general retinal level is + 2 D. and the floor + 0·5 D., the latter being depressed 1·5 D.

The "edges" of the hole are clean and sharply cut; between the edge and the floor parallactic movements

were obtained. Just below the hole is a small hæmorrhage, and the retina around the hole, especially above, is striated, as if arranged in radiating pleats, which are greyer than the surrounding parts.

This patient is still under Mr. Lang's care. The vision of the R. has improved $\bar{c}\ \frac{+\ 1{\cdot}5\text{ D. sph.}}{+\ 0{\cdot}5\text{ D. cyl.}} = \frac{5}{18}$ read slowly and with some difficulty. The letters, he says, look jagged and crooked. R. Field full. There is a relative central colour scotoma.

The appearance of the fundus has altered considerably from the time of his first visit, but the main feature—the hole—remains practically unchanged.

This case is exceptionally interesting, as the patient was seen by Mr. Lang within some sixty hours of the infliction of the injury, and a good view of the fundus was then obtained. The "hole" itself (with exception of Case 11), is the smallest of the series, and associated with this fact is the retention of quite useful vision (Plate XIII, fig. 1).

Case 8.—Walter B—, æt. 37, shown at the Society's meeting May 3rd, 1900.

Case 9.— — —, male, shown by Mr. Treacher Collins at the Society's meeting March 8th, 1900 (Plate XI, fig. 1).

Case 10.—Mrs. Serena B—, æt. 60. St. George's Hospital, May 16th, 1900; wanted reading glasses; did not know there was any defect of R. E.

Present condition.—R. V. $\frac{6}{60}$ not improved, p.n. T.n. refraction R. $\left.\begin{array}{l}\text{E.}\\ -\\ -\end{array}\right| +1.$

L. V. $\frac{6}{12}$ Hm. 1 D. $= \frac{6}{9}$.

Right ophth.—At the macula is an almost circular mottled area of dark red colour about $\frac{1}{2}$ O. D. d. In the upper half of this are eight irregular white glistening dots, the largest of which is a little outside the centre.

The surrounding retina is greyish and has a well-marked reflex. By the direct examination the reflex is best marked below, where the edge has a specially bright line. The "floor" here appears dark, as if the edge threw a crescentic shadow on to it. The floor is depressed 1 D. below the edge (H. B. G.); there was a divergence of opinion as to parallax. By the indirect method, the edge is sharply and equally defined from the floor all round. Fundus elsewhere normal.

R. Field full. There is a definite central scotoma for green of some size. Mr. Grimsdale adds, "the white absolute scotoma is very small and I could not map it, but white is dull all over green scotoma." She sees, since her attention has been called to it, a positive scotoma "about as big as a sixpence" placed centrally on any object she looks at with this eye. The scotoma appears continually in motion like smoke.

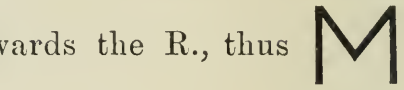
The history is defective. She was not aware of any defect of right eye when she came to the hospital, and denied receiving any blow on it. On further questioning, however, she recalled an accident some eighteen months ago, when she struck the outer side of right orbit—"not the ball of the eye"—a violent blow against a marble mantelpiece; a bad "black eye" followed. She is quite positive she did not damage the sight, but as she had not noticed any failure until her first visit to the hospital, her statement on this point is by no means conclusive.

I am indebted to Mr. Grimsdale for the notes of this case (Plate XIII, fig. 2).

Case 11.—H. M—, æt. 38. Consulted Mr. Donald Gunn on account of the defective vision of L. E. May 24th, 1900.

History.—In February of this year was struck in the L. E. by a stick which he was engaged in chopping. Sight very misty for a few days, then cleared at periphery of field leaving a green patch at centre. Slight further improvement since then.

Present condition.—R. V. $\frac{6}{9}$ no Hm. 1 J.

L. V. $\frac{6}{36}$ to $\frac{6}{24}$ "comes and goes," straight lines appear bent with the concavity towards the R., thus  to him looks Refraction "emmetropic" T.n. Pupil perhaps a trifle elongated vertically; small notch at sphincter margin of iris down and in.

Left ophth.—Media clear. At the macula is a small circular area having the typical appearance of the holes previously described. The "floor" of the hole is a bright red—comparatively—irregularly spotty, and has a white line curving across it. There are further two dark patches of aggregated pigment lying on the floor close to the lower edge of the hole. The edge is well-defined and sharp, but has not that sodden œdematous look seen in many of the cases, being more transparent and "ice-like." The lower part of the edge itself is pigmented at a point corresponding to one of the pigment patches on the floor, but apparently perfectly distinct from it. Surrounding the hole is a zone of slightly pale retina fairly well defined by a series of fine concentric shifting light reflexes at outer margin.

Outside this again at nasal side a brighter reflex, at temporal side a pale area of disturbed pigment, bordered in places by dark spotty pigment.

The pale zone around the hole shows three soft pale spots close to the edge.

Between the edge and the floor there is a difference in level, I think, of at least 1 D. Parallax doubtful. Left field full; there is a relative but apparently not an absolute scotoma for colours.

A particular feature of this case is the small size of "the hole," probably not more than $\frac{1}{6}$ O.D. d. (Case 7 is the only one that at all approximates it in size). The pale zone surrounding the hole is about $\frac{1}{2}$ O.D. d. or a little more, and this area corresponds to the hole as usually seen.

The true hole in this case is so small that the determination of a scotoma becomes exceedingly difficult. Mr. Gunn has most kindly furnished me with a pen and ink drawing of the central part of the fundus on a somewhat enlarged scale.

Case 12. Group B.—John W—, æt. 53, gardener. Royal London Ophthalmic Hospital, Moorfields, December 16th, 1896. Defect in left eye of old standing.

History.—In August, 1888, was engaged in trimming some branches of a tree which overhung the garden path. As he cut off a stiff twig the proximal end rebounded and struck his left eye. This was followed immediately by loss of sight in left eye (except hand movements over his temporal field), and the condition has remained unaltered since.

He is sure sight of left was as good as right before the accident, but it is not clear that he had ever tried each eye separately.

Present condition.—R. V. $\frac{6}{9}$ Hm. 0·5 = $\frac{6}{6}$.

L. V. Hand movements. T.n. L. pupil > R. pupil; acts sluggishly to strong light. *Ophth.*—R. E.: fundus normal; retinoscopy and estimation give refraction + 1 D. *Ophth.*—L. E.: there is a very extensive shallow detachment of the retina over the whole fundus as far as observation permits, and right up to and even over the edges of O. D. The level of the detachment varies a little—from + 6 D. to + 8 D.—in different parts.

The retina has retained its transparency quite perfectly; the colour is somewhat paler, that is, more of an orange shade than in a normal fundus.

At the macula, or a point corresponding to its situation in the detached retina, is a roughly circular hole showing some clear frayed tags of retina hanging from its edges.

Radiating in different directions from the hole are transparent folds in the retina, becoming very obvious as the light from the mirror is shifted. The edges of the

hole are best seen with + 7 D., and with this glass "the floor," that is the part enclosed within the edge, appears bright red, but no detail is visible.

"The floor" is best focussed with + 1·5 D., and then seems to have a finely granular appearance without evident pigmentation, and to be of a deeper red than the rest of the fundus.

Parallactic movements are very marked, and there is a difference in level of at least 5 D. A few peripheral striæ in lens. Left field taken; nasal and central field abolished; hand movements over greater part of temporal field (Plate XI, fig. 2).

(Seen on three or four occasions during next twelve months; no alteration in ophthalmoscopic appearances.)

Case 13.—Reginald S—, æt. 12, schoolboy. Royal London Ophthalmic Hospital, Moorfields, February 10th, 1897, complaining of defective vision of right eye since twelve months.

History obtained from the father indefinite and unsatisfactory. It appears that the sight in both eyes was believed to be good up to February, 1896. Returning home from school at this time he was struck a severe blow in R. E. by a stone. According to a neighbour's account the boy was "fuddled" and rendered partially insensible by the blow. There was a small cut over the middle of right eyebrow, and another on the corresponding point of right lower lid. The eye itself was not noticed to be injured (externally).

A few days later the father tried the two eyes separately and found the right very defective.

Present condition.—R. V. fingers at 1 metre, fixes excentrically and very badly. R. pupil acts very slightly to light, well consensually; T.n. L. V. (under homatropine and cocaine) $\frac{6}{6}$, two letters, $\bar{c}$ + 1 D. = $\frac{6}{6}$. Retinoscopy + 1·5. Fundus normal.

Ophth.—R. E.: a few small floating opacities in vitreous. There is a very extensive shallow retinal detach-

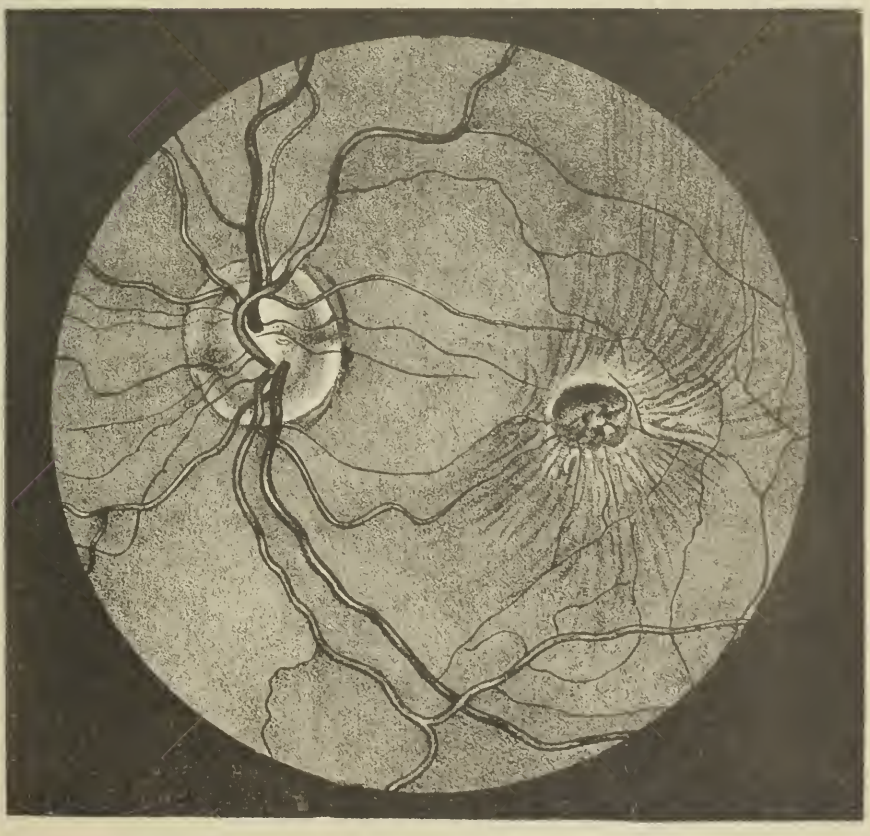
PLATE XIV.

Illustrates Mr. F. Menteith Ogilvie's paper on One of the Results of Concussion Injuries of the Eye ("Holes" at the macula) (p. 202).

Fig. 1.—Right eye of Case 13.

Fig. 2.—Left eye of Case 14.

Fig. 1.



M. B. Taylor, *del.*

Fig. 2.

Bale & Danielsson, Ltd., Lith.

ment extending over whole fundus; the retina is transparent, and the colour of the fundus is normal.

At the macula is an oval hole in the retina, its long axis oblique. The appearance may be compared to a hole cracked out in a thin sheet of ice. The space within the hole is deep red in colour, darker than surrounding fundus, but no details of the floor are seen.

The edges of the hole are sharp and transparent, like the broken edges of thin ice; at the lower edge is a conical projection on which the light plays, making it appear white and glistening. The retina surrounding the hole appears whitish and finely granular, and a strong light halo moves round this surface with the movements of the ophthalmoscope.

Refraction at the centre of O. D. appears to be about 3·5 D. and about 5 D. at the margin; over the rest of the retina + 7 or + 7·5 D.; the edges of the hole being perhaps best seen with + 7 D. The floor is not easily focussed, but + 3 D. gives the best definition. Well-marked parallactic movements between "edge" and "floor." Right field taken (perimeter) (Plate XIV, fig. 1).

Case 14.—Charles P—, æt. 22, packer.

History.—In September, 1893, he was engaged as errand boy (or grocer's assistant). Hurrying down a dark passage in the basement without a light ran against a blunt piece of wood about six or eight inches long, which stuck out from the wall like a hat peg. The peg was on a level with his head and struck him full in the L. E. On reaching daylight again was unable to keep the eye open on account of pain and photophobia. It was bandaged for three days, and after this gave him little trouble.

He did not know sight was defective in this eye till nearly five months later, when he was knocked down in the street by a vehicle coming from behind on his left side. He escaped any injury in this accident, and shortly afterwards presented himself at St. George's Hospital

on account of the extremely defective vision of L. E. (February, 1899).

He volunteered the statement that sight in both eyes was good in the middle of 1893, as he had had his vision tested for military service.

Mr. Frost noticed the detachment and the appearance of the hole in the macular region.

On March 19th, 1897 (*i. e.* about four and a half years after the accident), I first saw him.

R. V. = $\frac{6}{5}$, no Hm.; 1 J. readily. R. pupil normal; T.n. Refraction estimated Em.

L. V. = $\frac{2}{60}$, not improved; puzzles out letter of 20 J.; T.n.

L. pupil = about 6·5 or 7 mm. when R. is covered; acts slightly and sluggishly to light; readily consensually.

Ophth.—R. E.: Negative.

Ophth.—L. E.: Media clear; at any rate no gross opacities in vitreous. There is a very extensive, shallow, transparent detachment of the retina extending in all directions as far as can be seen.

The temporal half of the O. D. appears to be emmetropic, while on the nasal half the retina gently rises off the O. D., so that the refraction at the nasal margin appears to be about + 2·5 D. or + 3 D. Further away from O. D. the retina is, in most places, best seen with + 6 D. Rather less upwards and in the macular region, and perhaps rather more downwards and down and out.

At the macula is an irregular oval hole in the retina, its long diameter transverse—in length about $\frac{2}{3}$ O. D. d., and in height about $\frac{1}{2}$ O. D. d.

The hole itself is sharply margined above, whilst its outer and lower edges are somewhat ill-defined and shade away into the soft grey haze of the surrounding retina.

At the lower outer angle of the hole (on a level with the edge) is a circular white spot which strongly refracts light.

The retina for some short distance round the hole is greyish white and finely mottled; while extending

radially from the edge are numerous fine ridges or pleats readily seen as the light is shifted.

The upper third of the hole, that is, "the floor," can be easily defined as a mottled red surface, and the refraction accurately determined as either Em. or + 0·5 D.

The lower two thirds of "the floor," on the other hand, are ill-defined and hazy; the upper margin shading away into the clear floor, and the lower part gradually losing itself in the ill-defined lower and outer border of the hole.

The colour of this part is a somewhat dull red, as if the floor were looked at through a grey veil, and no details of the floor can be seen.

Well-marked parallactic movements between "the edge" and "the floor" (Plate XIV, fig. 2).

Case 15.—Dr. Henry D. Noyes reported a case in the 'Trans. Amer. Ophth. Soc.,' 1871, p. 128, evidently of the same nature as the last three cases (Group B) I have just read.

"A girl, æt. 16, was struck in the eye by the cork of a beer bottle. Three years later she was seen by Dr. Noyes. The vision was bare p. l. *Ophth.* showed a normal O. D.; the retina was lifted up by a stratum of fluid most abundant below and to the outer side. At the middle of the fundus the retina became of a greyish-white colour, and at the yellow spot was a *round red spot of about half the diameter of the O. D.* By the direct method this showed a distinct reddish granular appearance, and it was evident that the epithelium of the choroid was exposed. The surface of the retina was evidently considerably in front of the level of the choroid, and this difference in level suggested the idea of a *laceration of the retina at the yellow spot; and that the red spot was merely a hole through which the choroid was seen.* Further proof of this was obtained by the phenomena of parallax. The edge was not tremulous, nor was there any tissue sloping down from it to the spot. It was evident that the observer looked under the retina."

Dr. Noyes has no explanation to offer of the mechanism of the rupture. He says it is the only instance he has seen or read of. The vitreous was so transparent that it could hardly have participated in the mischief.*

The following observations are directed chiefly towards Group A. Much that is written of the series applies equally to Group B, but a brief note is added on their special feature, viz. a detached retina.

In considering the main feature of these cases—the central "hole"—we are at once confronted with the fact that such eyes do not come into the pathologist's hands; and much, therefore, that in the event of such an examination would be placed on a solid basis of fact, remains obscure and largely a matter of theory.

The application of (1) ordinary physical laws and (2) the anatomy of the macular region seems, I think, to explain sufficiently the making of "the hole," and its situation. But exactly what "the hole" is, what its floor is composed of, and why it presents its peculiar features—depression, colour, and so forth—is largely a matter of conjecture, and must remain so until the microscope reveals its intimate structure—

1. Mechanics.
2. Anatomy.
3. Pathology.
    - (*a*) Level and nature of floor.
    - (*b*) Colour.
    - (*c*) Shape and size.
    - (*d*) Vision.

1. *Mechanics.*

A physicist describing the eye, and disregarding its optical properties, might perhaps speak of it as an elastic

* This abstract is borrowed from the 'Royal London Ophthalmic Hospital Reports,' vol. vii, p. 424. The italics are mine.

sphere containing fluid—like a tennis ball full of water; and he would further say that any force striking such a body would be transmitted equally in all directions from the point struck. Let that point be exactly the centre of the front of the sphere, then the vibration waves will be transmitted through the solid coats backwards to a corresponding point at the back of the sphere, where the waves would meet and the maximum stress would be felt —and this effect would be further intensified by the secondary waves set up in the included fluid at this point.

2. *Anatomy.*

The retina is attached at the O. D. and the ora serrata; excepting at these two points it can be readily lifted off the underlying pigment epithelium. The macula lies at the posterior pole of the eye; its position consequently renders it especially liable to suffer from concussion injuries applied to the cornea.

Further, this region is by far the weakest part of the retina for several reasons.

The edge of the macula represents the thickest part of the retina (0·49 to 0·5 mm.), from the edge the retina dips sharply down to the bottom of the fovea, the thinnest part of the retina (0·1 mm.)—the whole cup being formed at the expense of the retina. The largest retinal blood-vessels are absent in this region; while the nerve-fibres, sweeping outwards from the disc, pass above and below the macula, thus rendering an already weak spot weaker still.

3. *Pathology.*

(A) *Level and nature of "floor."*—The cases belonging to my own collection (3, 4, 5, 7, 8, 10, 11) were seen by a number of different ophthalmic surgeons. If not all, certainly the very large majority of these gentlemen were quite clear there was a decided difference in level between the edge and the floor of the hole, and that the

floor was *depressed.* Exact measurements of slight differences in level by means of the ophthalmoscope are no doubt open to criticism, but in these cases there was a curiously unanimous concensus of opinion as to the difference in level—the highest estimation was 2 D., the lowest 1 D., and the general average 1·5 D.*

Allowing for the moment that there was a uniform difference in the level between the edge and the floor of 1·5 D., we may account for this by supposing—

(1) That the retina has come forward from œdema or other causes 1·5 D. from the macula; or,

(2) That the surrounding retina has remained practically unaltered in level, while the intermacular retina has sunk to the bottom of the fovea, that is, to the thinnest part of the retina. This latter is the theory I support.

The forces starting from the anterior pole of the eye, and spreading from that point in all directions, meet at the posterior pole—that is the region of the macula—and there the waves break, and the stress of the injury is felt; this is, of course, the old theory of "*contre coup,*" and though this theory has now been discarded as an explanation of "fractured base," it is perfectly fitted to explain such a result in an elastic fluid-containing sphere such as the eye.

The breaking force, then, may be supposed to fracture the retina, probably as a many-starred fracture running radially down from the edge of the macula in every direction towards the fovea; or possibly in some cases it actually forms an annular fracture just internal to the thickened edge of the macula with a true solution of continuity between the nerve-fibres and the ultimate retinal elements.

Portions of the disintegrated retina remain attached to the floor, but the bulk of the fractured membrane, by reason of its own elasticity, curls up and becomes infolded

* This refers, of course, to Group A; in Group B the difference in level was very much greater.

under the edge, and we then see the floor on a level plane, consisting of degenerated retinal remains lying directly upon the unaltered choroid, and bounded by the steep edges of what was the macular margin.

Most of these cases show yellow or whitish spots on the floor, probably at slightly different levels, and these I take to be remains of retinal tissue. Crystals of cholesterine are seen in almost every case.

The retina in the neighbourhood of "the hole" is variously altered; usually it is pale, sodden, and œdematous looking; presumably there was an exudation of serum and round cells at the time of the accident, and these cells have become in part organised about the site of the fracture, leading to fibrosis of the retina. Pleats or folds radiating from the hole are seen in many cases; the more recent the case the more numerous and marked they appear to be. In cases of long standing they are absent. These are the direct result of œdema, and pass off as the exudation is absorbed.

(B) *Colour.*—This is always a stronger red than the surrounding fundus, and generally a dark red speckled with pigment. In the less decided cases the colour is like the cherry spot of embolism; in others the deep red, irrespective of pigment disturbance, is unlike any other retinal condition with which we are familiar.

Contrast has been suggested as the explanation of this phenomenon, but contrast alone is not sufficient to account for the appearance; it intensifies it, no doubt, and assists in forming the picture, but something further is needed to give the dark red colour usually seen.

The normal retina is not wholly transparent. The atrophy and consequent removal of the overlying layer allows the pigment layer and choroid to be seen with unusual clearness. Further, the pigment in the retinal epithelium is particularly plentiful and dark, and the choroidal capillary circulation extra-abundant at the macula in the normal eye. In these cases it is rendered more evident by the lowering of the whole intermacular

retina on the pigment bed, thus being viewed directly without the disturbing reflex of the macular edge. Finally, in many cases the effect is increased by the emigration of pigment granules into the degenerated retina.

(c) *Shape and size.*—Considering the cases collectively the shape and size of the hole is fairly constant, in shape either round or oval, and varying in this respect no more than the macular reflex in the normal eye; in size the great majority are about $\frac{1}{2}$ O. D. d. In one case (9) only is the size much greater, approximately equal to the O. D., and in two cases (7, 11) much smaller, $\frac{1}{4}$ and $\frac{1}{6}$ O. D. d. respectively. Such variations as do occur may perhaps be accounted for by the anatomical peculiarities of the eye struck, or by the nature of the blow.

(d) *Vision and scotoma.*—If we have to deal with a true anatomical hole in which there is a complete and perfect separation between the retinal elements and the nerve-fibres connecting them with the optic nerve, it is clear that central vision must be absolutely, totally, and permanently lost. We might expect in such a case a full field, with a central absolute scotoma and vision below $\frac{6}{60}$. As a fact, the first two cases which came under my notice (3, 4) did present these features. But further experience showed this was by no means the rule, even though the ophthalmoscopic appearances were quite typical, and apparently similar to these. Vision in the remaining cases of Group A was of a higher quality than in the two just quoted:* in three $\frac{6}{60}$; in two $\frac{6}{36}$; in two $\frac{6}{24}$; in one $\frac{5}{18}$.

The question then arises, is it possible that such vision could remain in any eye from which the central area of the retina had been removed as a functional structure?

Take the average "hole" at $\frac{1}{2}$ O. D. d., and the angle which corresponds to the horizontal diameter of the O. D. as 6°; this gives the angle corresponding to the central area lost 3° or 1·5° on either side from fixation.

* In all those cases where any useful vision has been preserved metamorphopsia has been a dominant symptom.

What is the highest vision obtainable excentrically 10° off fixation ?

Authors differ very widely on this point.

M. Dor,* for instance, with Snellen's types obtained $\frac{1}{4}$ normal V. A. at 5° from fixation, and $\frac{1}{15}$ at 10°, and others have obtained somewhat similar results. On the other hand, some very competent observers put vision 5° off fixation no higher than $\frac{1}{10}$. If eccentric vision really approaches the results first quoted, there is no *à priori* reason why the vision of these patients should not have reached the standard it did, even though the central retina had been entirely destroyed.†

If this view is not accepted, an alternative theory may be advanced to account for the comparatively good vision found in some of these cases. We may suppose that some of the retinal elements in the damaged tissue of the floor still retain their central connection, and that consequently some of the nerve-fibres of the macular bundle, entering from the inner side, have escaped destruction in the general wreckage of the macula.

Regarding the central scotoma. In four cases for various reasons no investigation was made; in the remaining seven, four showed well-marked absolute scotoma for white; one showed absolute colour scotoma, and (?) very small ditto for white; while two others had a relative colour scotoma only.

It is only fair to add that the mapping of small scotoma with indifferent fixation on the part of the patient is attended with great difficulty, and I do not think that a negative result always proves the absence of the scotoma.

The four cases comprised in Group B need a few words. Here, as in the former group, we may fairly assume we

* 'Traité complet d'Ophtalmologie,' De Wecker and Landolt, vol. i, p. 640; see also this whole chapter, pp. 593, 647.

† For the purposes of this argument the area of the hole alone has been considered, and the surrounding retina, right up to the edge, is supposed to be functionally perfect, an assumption which can hardly be literally justified; but since the functional value of the surrounding retina can only be a matter of guesswork it has been left out of the question.

are dealing with eyes which previous to the accident were healthy.

Why, then, if a blow upon the eye in the first series produces a retinal "hole," and leaves the retina *in situ*, should the retina detach in the second series? The answer would seem to lie in the character of the impinging object, its shape, size, or velocity, and to be independent of the eye struck, which so far as history went appeared to be normal.

However, be this as it may, the fact remains that when these cases were first seen the retina was found detached. It will probably—and I think justly—be assumed that the retina was so detached, and the macular rent produced on, or immediately after, the receipt of the injury. But here it must be remembered that of these four cases not one was seen by an ophthalmic surgeon for a very considerable period after the accident —eight years, one year, five months, and three years respectively.

Quite apart from the macular hole, and viewed simply as detachments, these cases present some very noteworthy points :

1. The retina is everywhere transparent, and the detachment seems to show no tendency to increase even after the lapse of many years.

2. The detachment is flat, shallow, and extends over the whole fundus. No undulating or wavy movements are seen in the detached membrane.

3. In all cases a certain amount of vision—of course of a very low order—has been retained.

4. The eye viewed as a whole, is strikingly free from those degenerative changes, depending on altered or impaired nutrition, one might expect to find associated with a detached retina of long standing. T.n.; A.C.n.; lens clear; vitreous but little affected. (In two cases the vitreous seemed free from opacities; in the third "a few small floating opacities are noted;" in the fourth (Noyes' case) the vitreous is expressly stated to have been "so trans-

parent that it could hardly have participated in the mischief."

Literature.

The literature of this subject is scanty and unsatisfactory. English and American text-books in most cases devote a certain amount of space to concussion injuries of the eye; the grosser lesions—ruptured globe, dislocated lens, concussion cataract, and ruptured choroid—all receive a due amount of attention. "Commotio retinæ" is described more or less fully in most books, the authors usually following Berlin's* original description, but with the one exception of Noyes' case, recorded above, I can find no published case similar to those collected in this paper, or, if the reported case is essentially the same, it is differently viewed and described by its author.

Central lesions the result of blows upon the eye have been treated of by several authors, notably Haab, in "Diseases of the Macula Lutea,"† a large portion of the paper being devoted to central changes following blows; and again in his Atlas (see especially fig. 38, 1), Meyer,‡ a pupil of the above, has a paper on the same lines as Haab.

Knapp§ records a case of a central lesion following a blow, similar, I think, to mine, and illustrates it with a woodcut. The author, however, regards the central dark red area as a hæmorrhage, and, indeed, takes a very different view of the pathology of the ophthalmological appearances to that I hold.

He describes the case at some length. The patient was struck with a stone in the right eye four weeks before Knapp saw him. "In the region of the yellow spot was a granular blood-spot rather darker than the

* Zehender, 'Klin. Monatsbl. f. Augenh.,' Stuttgart, 1873, p. 44.

† 'Bericht ueber d. Ophth. Congress,' Heidelberg, 1888.

‡ 'Inaugural Dissertation,' Zurich.

§ 'Archiv f. Augen und Ohren.'

surrounding region, evidently the cause of the central scotoma." Six weeks later ". . . . the red spot at the macula was rather paler, and a number of black dots scattered irregularly over its surface;" scotoma smaller; no metamorphopsia. Five weeks later . . . . "the red spot (extravasation) was not so well defined in its circumference, but marked at the margin with dark points and lines; the outer part of its surface was red as before, but spotted with yellow and black streaks. Inner half rather white, with red and white stripes and black dots. The surrounding retina somewhat opaque, and formed a bluish zone about a third disc diameter round the spot. This zone, as well as the blood-spot, was slightly raised above the general level. One month later, ". . . . macula more pigmented." The figure he gives is very suggestive of the typical "hole."

Loring* describes certain cases of retinitis, apparently unconnected with injury. He mentions "the peculiar appearance which the central portion of the region of the macula and fovea present. This latter seems to be so sharply defined that it offers the appearance of a clean-cut opening—as if, indeed, the tissues at this place had been cut with a punch."

"I have seen," he says, "cases of the kind which had been diagnosticated as rupture of the retina at the fovea." Loring considers the appearance due to temporary swelling which ultimately subsides entirely.

Leslie Buchanan† has a paper on "Retinal Changes in the Macular Region the Result of Injury." This paper is somewhat difficult to follow, but it gives the pathological conditions found by the microscope in certain injured eyes.

In conclusion I would lay great stress on the relationship between the cases in the two groups A and B. In the latter series we have a detached retina with a true and undoubted hole, rent, or gap in the retina at the

* Loring, 'Text-book Ophth.,' vol. ii, p. 138.

† 'Ophth. Review,' 1898, pp. 105—108.

region of the macula, so that it is possible to look under the clear ice-like edge of the fracture and see the underlying pigment epithelium. These lesions have been produced by a concussion injury of a similar nature, speaking broadly, to the cases collected in Group A.

In these the retina is in place and there is the appearance of a punched-out hole. If we allow, as I think we must, that the cases in the second series are in actual fact really holes or gaps in the retina, then surely it is a justifiable assumption that in the first series (Group A) we are looking at the same condition less the detached retina.

It is the relationship between these two groups which furnishes the best justification of the title I have used in this paper.

Whatever views the Society may hold as to the real nature of the lesion, certain definite conclusions are furnished by a study of the cases brought forward this evening:

1. That, whatever its nature, the lesion is fairly definite and constant in shape, size, and appearance—that it is confined mainly to the central region, and that the rest of the eye escapes with comparatively little damage.

2. That the appearance found is the immediate and direct result of the injury (Cases 4, 7, 8), and not the end of a series of changes taking months or years to accomplish.

3. That the appearance remains unaltered probably throughout life, but certainly for many years. Of course there are changes to be noted for the first few months while the eye is "settling down," but after that period there are no further changes.

4. That the general disturbance of the eye in these cases is often slight—so that the patient, in hospital practice at any rate, rarely comes for treatment for some months after the injury, although the sight has been irretrievably damaged—and that often the damage is dis-

covered accidentally many years after, when the blow which caused it has been entirely forgotten.

5. Lastly, that the appearance is found as a result of concussion injuries of the eye and, I believe, from no other cause. If on examining an eye, the ophthalmoscope reveals the very typical lesion, we may assume a concussion injury of some kind even though no such history be forthcoming.

Finally, I should like to draw attention to the tabulated list of cases and to take this opportunity of thanking those surgeons who have allowed me to make use of them, and especially to acknowledge my indebtedness to Mr. Grimsdale for the great help he has given me in preparing this paper. (*July 6th*, 1900.)

Mr. Adams Frost said the paper had been extremely interesting to him, because he had seen several of the cases, two of them having occurred in his own practice. He could endorse all that that Mr. Ogilvie had said with regard to the appearance of the cases. The sharp edge bounding the circular depression was exceedingly striking, as also was the uniform depth at which the floor seemed to lie, namely $1\frac{1}{2}$ D. As to the pathology, in view of its obscurity it would be extremely interesting if Mr. Ogilvie would experiment as to the result of blows upon human eyes recently removed from the body, or on those of animals. Concussion of regulated force could be made, and then observation made as to whether the retina became detached at the macula.

The President said such experiments, if carried out, would be very useful, because at present, although Mr. Ogilvie had made intelligent conjectures, he himself would allow that he did not go much further. If experiments were made, the Society would be glad to hear of the results.

Mr. Ogilvie, in reply, said he did not think any one knew much about those cases collected in Group A, and any attempt at explaining the appearances presented

must be more or less theoretical; but in the second series, Group B, there were undoubtedly true holes with a difference in level between the edge of the torn retina and the red floor of 4 D. to 6 D.

XI. OPERATIONS.

Optical iridectomies for lamellar cataract.

By G. Anderson Critchett.

W. S—, æt. 8, came under my care last January suffering from cataract of the zonular type. His father, two aunts, and eight cousins were all said to have had lamellar cataracts.

His vision was—

R. E. = $\frac{5}{60}$ Sn. and J. 4 with difficulty.

L. E. = $\frac{5}{60}$ Sn. and J. 4 with difficulty.

Under homatropine the cataract in each eye was found to be of small size, rather dense, and surrounded by a faint second lamellar of opacity.

Vision was now greatly improved: R. = $\frac{6}{24}$ Sn.; L. = $\frac{6}{18}$ Sn.

His teeth are good, and there is no history of convulsions, nor any signs of past rickets. He had a bad attack of measles when four years of age.

On January 26th I performed an optical iridectomy upon each eye, inwards and slightly downwards. No complication.

April 23rd.—

R. V. = $\frac{6}{24}$ $\bar{c}$ + 1 D. cyl. axis 120° = $\frac{6}{18}$ Sn. and J. 2.

L. V. = $\frac{6}{24}$ $\bar{c}$ + 1 D. cyl. axis 120° = $\frac{6}{18}$ Sn. and J. 2.

Together $\frac{6}{12}$ Sn. imperfectly, and J. 1.

(*May 3rd*, 1900.)

Mr. Adams Frost agreed that the case shown was most suitable for the treatment the President had adopted,

because the area of opacity was so very small. His own experience, however, was that such a condition was quite exceptional; he had hardly ever found one which was suitable. He would be glad to know whether the President found other cases frequently as suitable as the present. He (Mr. Frost) generally tested vision without mydriatics, and then dilated with a mydriatic. If the vision improved under the mydriatic, he thought there would be a reasonable chance of iridectomy also producing an improvement.

Mr. Nettleship agreed with Mr. Frost that in this particular case the course adopted was the best possible. But he (Mr. Nettleship) also took the position that the number of cases in which the opaque lamellar cataract was small enough, and the cortex good enough, to make the artificial pupil, were very few. He had seen many cases in which artificial pupils had been made, in which the better treatment would have been removal of the lens. The President had mentioned the question of the opacity extending into the clear cortex. The old doctrine was that in lamellar cataract spicules projecting into the cortex might be taken as a sign that the rest of the lens would become opaque. He dissented from this view. He had seen two or three old persons in whom ordinary senile cataract had been grafted on to a previously existing lamellar opacity. But he had not seen a young person with lamellar cataract and a few spicules, in whom those spicules extended into the lens and made the rest of it opaque. Where the sight in lamellar cataract became worse as the patient got older, he thought it did so, although the cortex remained good, not because the opaque "lamella" extended, but because the part which was already opaque became more opaque.

Mr. Holmes Spicer asked the President how he did the iridectomy. It was a very neat and small coloboma. He would also like to know, if they looked ahead fifty years, and the boy's lenses became opaque and one were

called upon to do an extraction, and iridectomy were part of the operation, how he would deal with it ?

Mr. Critchett said he was showing the case not because there was anything novel about it, nor about the treatment adopted—it was one which he had long been in the habit of using in cases which he thought were appropriate for it. The patient had a lamellar cataract with small central nuclei and an almost transparent peripheral portion of the lens. The margin of the central opacity was very clearly cut. There were none of those little unpleasant white radiating lines like stalactites, and that was why he selected that particular operation, for he had done small optical iridectomies downwards and inwards. Had there been radiating lines he would have mistrusted the case and dealt with it by discission. He had seen many cases similar to the present one which his father had operated upon thirty and thirty-five years ago; some of them he had seen quite recently, and there had been no increase in the opacity of the peripheral portion of the lens. He was aware that those cases did not obtain first-rate central vision: the present boy only got six-eighteenths. But he could see Jaeger 1 without glasses with either eye, and with a correction of one dioptre he read Jaeger 1 fluently. The operation made the patient independent of glasses throughout his life, those thick and heavy glasses that a patient must wear if his cataract were removed. He felt that an eye which possessed its lens was on the whole in a safer position regarding the future than one from which it had been removed. Thirdly, if the lenses did become opaque, his small iridectomies would not exercise any adverse influence, but rather the reverse, on any operation which might be subsequently adopted for the removal of the lens. He read a paper on the subject in 1882 at the Worcester meeting of the British Medical Association, and Dr. Little, of Manchester, subsequently wrote a very interesting one on the same lines. He would be glad to know whether he was alone in his opinion,

and whether any member would approve or traverse his statement.

He did the operation with a small needle set at an angle, and withdrew the iris with a Tyrrel's hook. He was careful not to make his incision too peripheral. In the first place the operator was apt to get the hook entangled in the conjunctiva as it was being withdrawn; and in the second place more iris was cut off than was wanted. There was just the chance that a little margin of iris would be left, which was sometimes useful in those cases. The operation certainly required a little experience, inasmuch as when the needle was introduced the operator must be bold, he must go right into the anterior chamber, because if there was hesitation the needle might run through the layers of the cornea instead of going at once into the anterior chamber, and that made the operation exceptionally difficult. Referring to Mr. Spicer's remark, he (the President) had actually done an iridectomy afterwards on a patient on whom his father had done the operation he had detailed, and in that case he had a Graefe knife specially constructed at an angle, so that he could make his incision inwards. He enlarged the iridectomy in that case, and the lens came away perfectly, with a very good result.

Mr. Frost had reminded him of an omission. They must go by the vision and by the size of the nucleus. He admitted the cases were exceptional; he was not urging that the operation should be adopted at all universally, and it was because he wished to show a case which was his ideal for the operation that he had brought the boy forward.

In reply to Mr. Nettleship, he said that if by extension was meant widening of the spicules, he had seen that in two or three cases. Probably his experience had been exceptional in that way, because at one time his father often performed the operation. His father had come to the conclusion that it was a mistake to do the operation where there were those spicules. The cases in which he

had seen them grow opaque had been patients between forty and fifty, and at that age the cataract could not be called senile. After an interval of ten years vision was worse and the spicules were wider. He agreed with Mr. Nettleship that it would be a mistake if the operation were adopted at all universally.

XII. MISCELLANEOUS.

1. *Value of radiant heat in eye disease.*

By R. W. Doyne.

There is, of course, nothing new in the use of radiant heat to the eye, and I dare say there may be nothing new in the procedure I have adopted for some time now in a certain class of eye troubles, that of utilising for this purpose an ordinary electric incandescent lamp. The somewhat analogous use of these lamps, enclosed in a kind of oven, has been in vogue for some time now in the treatment of joints.

The drawbacks to the application of hot fomentations have long been recognised, producing as they sometimes do a "soppy" condition of the conjunctiva and loss of tone in the skin, with consequent entropion, especially in elderly people; both of which conditions too frequently aggravate the mischief that the fomentations are intended to relieve.

The value of radiant heat in the shape of Turkish baths has for some time now been advocated in the treatment of cyclitis, and this is the condition for which especially I claim relief by the method I suggest, for it produces the effect locally of a Turkish bath in a concentrated form.

The great difficulty in relieving patients suffering from chronic cyclitis is too well known, and when it is occurring in patients over forty, I am inclined to look on such cases in the great majority of instances as practically hopeless.

Assuming that the trouble lies in the ciliary glands, described by Collins, the difficulty of the situation has prevented local treatment doing much good, while constitutional treatment does not seem to help much. Now with the application of radiant heat in the manner I describe, the anterior pole of the eye gets well roasted, and doubtless the effect of such roasting on the ciliary glands would be to set up increased metabolism, and as we have reason to suppose from analogous conditions this would tend to set up a healthy reaction; and this I believe to be the case.

I do not mean for a moment to suggest that all cases of chronic cyclitis that have been going on for years will at once get quite well. Such cases have been disappointing in the past, and I fear will continue to be so in the future; but I do say that at any rate in some cases a very marked amelioration has taken place in a short time, and some even have appeared to get well.

I will not try your patience by quoting cases, the time has hardly come for that, and to speak of a case as being definitely cured after going on for years requires a longer period of observation than I have as yet had opportunities of making.

In cases of acute iritis the frequent application of radiant heat in this way has at least been grateful to the patient in relieving pain, and has seemed to me superior to hot fomentations or the application of dry heated wool.

In chronic iritis, my experience has not been so encouraging, or to put it more definitely, it has not appeared to do as much good as in cases of cyclitis.

In neuralgic conditions of the eye, especially in neurotic patients, it is of great use, but perhaps not more than anything else that produces a strong mental impression.

Anyhow there are a troublesome class of patients who are always looking out for some new thing, and my

confrères may be glad of hearing of something fresh to suggest to them.

I generally use a sixteen-candle frosted glass lamp. The patient sits by its side keeping the eye as close as can be tolerated with the lids closed. In cases of chronic cyclitis or chronic iritis, I apply it at first for five minutes, increasing to twenty minutes three times a week or even daily. In cases of acute iritis, much more frequently, but for not longer than ten minutes at most. At first I used brown paper between the eye and the lamp, but now, except in cases of acute iritis, when I keep a pad of cotton wool on the eye, I use it without any intermediary. Of course the whole side of the face gets intensely hot, and it may produce a little giddiness, but except for this I have never found any inconvenience ; I direct the patient to sit still in the dark or subdued light for twenty minutes after the application, and I have found the value of the treatment increased by gentle massage and cold douching after the heat has been withdrawn.

I have brought this matter forward, not I hope prematurely, but at any rate before I have been able to form definite views of the degree of value to be attached to the treatment, but I have purposely done so in order to encourage others to try it, that at some future time perhaps from accumulated experience we may be able to decide with more authority on its merits. During the past year I have mentioned the method to several, and I shall be glad to learn their experience if they have tried it. (*October* 19*th*, 1899.)

The PRESIDENT said most of the members had read of what heat had done for lupus, and the results seemed very remarkable. With reference to cases of cyclitis, which were most troublesome, the experience of the Society was not great, but doubtless in the future more would be heard of the method.

Mr. BEAUMONT said he had used radiant heat for the

last year or two, and thought he had evolved the idea out of his imagination. He could corroborate all Mr. Doyne had said regarding its benefit in certain cases. He found it of no good in cases of chronic eye disease, but his experience was that it was useful in cyclitis and iritis. The simplest way of applying it, he thought, was to have the lamp blackened and wrapped round with layers of lint, according to the amount of heat required, the patient holding it against the eye three or four times a day for five minutes at a time. He had used it many times, and it had always given relief in iritis. The effect was to relieve the pain, he could not definitely say whether the treatment cut the attack short. He would apply it to an eye in a high state of vascularity, of course with the lids closed.

Mr. Lang said he might mention that the late house surgeon at Moorfields, Mr. Byers, drew his attention to the efficacy of the application of heat by means of electricity two years ago, and he (Mr. Lang) had been applying the method for many months to cases of interstitial keratitis. As Mr. Doyne did not mention that disease in his paper, he would like to say he had found it very efficacious in clearing up the second and third stages—the vascular stage and the subsequent deposit. He applied it in the way Mr. Doyne mentioned, daily, and three or four times a day. It materially cut short the course of the inflammation.

Mr. Doyne, in reply, said that at first he wrapped the lamp in brown paper, but had now discontinued it, as he found the light did good rather than harm. Of course in iritis there was a pad on the eye, but nothing was put on the lamp.

2. *Case of sympathetic ophthalmia coming on forty-seven days after enucleation of injured eye.*

By D. Cecil Shaw.

A. D—, æt. 19, a strong, healthy girl, received a perforating wound of the left eye on May 24th, 1899, by a pair of scissors thrown at her. She went to a general hospital, and was admitted as an intern patient, but insisted on leaving in a few days.

About June 20th she came to the Belfast Ophthalmic Hospital. There was a wound in the upper corneal margin, in which the iris was entangled; the eye was injected and painful; tension *minus*, and V. *nil*.

My colleague, Dr. Walton Browne, and I advised enucleation, which after some hesitation was permitted. I operated on June 28th; removed the eye entire, hardened it in formol, froze, and cut it. One half I mounted in glycerine jelly, and sectioned the other half in celloidin. No micro-organisms were found.

The patient made a quick recovery, and was discharged in about a week. She returned once or twice to the extern department; then disappeared till August 23rd, when she returned with a pronounced irido-cyclitis in the right eye, and gave the following history, which no cross-examination could shake.

The eye had remained perfectly well till August 14th, when she went an evening excursion by steamer in Belfast Lough. On the way home the eye suddenly became painful and injected, and began to water. It continued in this state for about a week, when V. began to fail, and then she came to hospital.

In spite of all treatment the eye went from bad to worse; the pupil could never be got to dilate, and became filled with lymph, and tension was markedly lowered.

Now, December 12th, the tension has become normal

again, the ciliary injection is rather less, but V. = perception of light only. If the eye quiets down and keeps free from all signs of inflammation for some time, I mean to try a discission operation as recommended by Critchett (1).

There can be little doubt that this is a case of true sympathetic ophthalmia, though a case coming on at such a long interval after a simple enucleation is exceedingly unusual, if not unknown. Cross (2) has recorded one at twenty-six days after enucleation, and Snell (3) one at thirty-two days. Several cases at longer intervals were reported to Nettleship's Committee (4), but in some of these the globe had been ruptured and there was inflammation of the orbit, and in others details were wanting.

References.

1. Critchett.—'Royal London Oph. Hosp. Reports,' vol. i, pt. 2.

2. Cross.—'Oph. Rev.,' 1887, p. 236.

3. Snell.—'Trans. of Oph. Soc.,' 1882.

4. Report of Committee, etc., 'Trans. of Oph. Soc.,' 1886.

(*Card specimen. December 14th*, 1899.)

The Chairman (Mr. A. Q. Silcock) said he supposed the eyesight was perfectly normal after excision of the exciting eye. He would like to know if the cornea of the sympathising eye had been examined for possible dots of keratitis punctata before she left the hospital. He had not had a case arising so long after enucleation. In his own hospital sympathetic ophthalmitis was so uncommon that it was difficult to get cases for investigation. He considered every fact recorded in connection with the disease to be of great use, especially positive evidence, and more particularly evidence of the presence of any form of micro-organism. Although the affection had not shown itself in the sympathising eye till forty-seven days after-

wards, still they would allow that it was conceivable the condition had commenced in that eye many days before it became obvious to the patient. They had all seen cases of cyclitis, as indicated by dots on the posterior surface of the cornea, in which, clearly, the disease had been going on for some time before it had become sufficiently obtrusive to cause the patient to seek advice.

Mr. Treacher Collins said the question in Dr. Shaw's case was whether the inflammation in the second eye was really caused by the injury to the first, or whether it was an independent attack of inflammation quite apart from the injury. As bearing on this point he might mention a case under his care in the hospital at the present time. The patient had an injury to one eye eight months ago, caused by a thorn running into the eye. The eye at once suppurated, was removed within four days of the injury, and he left the hospital with the other eye quite good. Eight months later he came back with iritis, floating opacities in the vitreous, and some dotted opacities on his cornea in the other eye. If the interval had been shorter than eight months, if the time which elapsed between the injury to the first eye and its removal had been greater, and if the inflammation in the injured eye had not been suppurative, it would certainly have been considered a sympathetic case. But the facts he had mentioned seemed to show that it must have been an attack of serous iridocyclitis in the second eye, quite independent of the injury.

Mr. Devereux Marshall said he supposed the great interest in this case lay in the extreme severity of the disease in spite of the fact that the injured eye had been removed. Cases of sympathetic ophthalmia after the removal of an eyeball were occasionally seen, but usually at a comparatively short interval. In them, however, the attacks were slight. He remembered one which occurred at Moorfields. A man was admitted on account of having wounded his eye with a piece of metal. The eye was excised, and a month later he came back with a fairly severe iritis, posterior synechiæ, and keratitis punctata,

which had appeared exactly two weeks after the eye was removed. Although no treatment was adopted during the two weeks from the onset to seeking advice, yet the application of atropine effectually broke down those synechiæ. The disease was of comparatively short duration, and ran a very mild course. He thought it had been generally observed that the cases of the kind occurring after excision were of a mild character, whereas in Dr. Shaw's case one could hardly imagine a more severe attack.

Dr. Shaw, in reply, said the sight was quite normal. He did not think the disease could have been in existence long before he saw her, as it progressed so rapidly, and the patient had done continuous reading the day before the onset of the symptoms. There was no keratitis punctata in the case. He regretted to say that he had not cut the posterior part of the eye, though it was in his possession. In reply to Mr. Collins's remarks, of course it was possible that the case was not one of sympathetic ophthalmia; but the girl was perfectly healthy, had no specific history, and no history of any illness to account for it. He regretted to say that in the north of Ireland sympathetic ophthalmia was not by any means so rare as it appeared to be in London. Patients came from remote country districts weeks or months after injury, sometimes with far advanced sympathetic ophthalmia. His present patient showed the typical picture of sympathetic ophthalmia. One point about it had always been noticed, namely, the extreme difficulty of doing anything in the way of treatment. Atropine seemed to have no effect upon the eye. Mr. Nettleship's Committee came to the conclusion that sympathetic ophthalmia coming on after enucleation ran a mild course. But his present case was quite the reverse. The retina was completely detached. He would certainly examine the posterior half of the eye.

3. *Experimental exophthalmos and enophthalmos.*

By Walter Edmunds.

[From the Laboratory of the Brown Institution.]

There are three ways in which the prominence of the eyes can be affected experimentally—(1) by acting on the cervical sympathetic, either by stimulating it or dividing it; (2) by the administration of certain preparations or drugs; (3) by operations conducted on the thyroid gland.

With respect to the first of these methods, stimulation of the cervical sympathetic produces—

1. Prominence of the eye.
2. Widening of the palpebral fissure.
3. Dilatation of the pupil.
4. At first increase, and later decrease, of the intra-ocular tension.
5. Erection of hairs on the head.

On the other hand, division of the cervical sympathetic produces—

1. Retraction of the eye.
2. Narrowing of the palpebral fissure.
3. Contraction of the pupil.

The second method of altering the prominence of the eyes is by the administration of certain substances: cocaine is one of these. It has been shown by Jessop that cocaine produces—

1. Proptosis.
2. Widening of the palpebral fissure.
3. Dilatation of the pupil.
4. Decrease of intra-ocular tension.

Similar effects are produced by preparations of the thyroid gland. Cunningham has shown that certain preparations from the thyroid produce in healthy animals

Fig. 11.

Monkey before operation or treatment.

Fig. 12.

Same monkey as Fig. 11, three months after total excision of thyroid.

Fig. 13.

Same monkey as Figs. 11 and 12 after operation and after thyroid feeding.

exophthalmos. He gave by the mouth to a normal rabbit 0·1 gramme of a thyroid extract, and produced thereby exophthalmos. He gives a photograph of the rabbit, showing the exophthalmos very clearly.

I have obtained similar results in monkeys. Six experiments were made. To the monkeys were given by the mouth large doses of preparations from the thyroid of sheep, the daily dose corresponding to at least half the thyroid of a sheep. The effects produced were—

1. Proptosis.
2. Dilatation of pupils.
3. Widening of palpebral fissures.
4. Erection of hairs on head.
5. Hair falling out in patches.
6. Paralysis of one or more limbs.
7. Emaciation and muscular weakness.
8. Death from asthenia.

In order to detect any changes in the eyes, sketches of the monkeys were made before and (if any change was detected) after treatment.

Exophthalmos after the administration of thyroid has been observed in man. Béclère had under his care a woman suffering from myxœdema, for whom he prescribed thyroid feeding; by error very excessive doses were taken, with the result that various ill effects were produced; amongst them Béclère mentions a certain degree of exophthalmos.

Fig. 14.

A monkey before treatment; no operation.

The third method of affecting the prominence of the eyes is by operations on the thyroid gland.

It has been attempted to increase the amount of thyroid internal secretion in an animal by increasing the amount of his thyroid, to be effected by transplanting into him the thyroid of another animal of the same

species; these attempts have generally failed, the transplanted gland being simply absorbed, and no trace of it being visible after a few days; that, at least, has been my experience.

With respect to removal operations which reduce the amount of thyroid, the thyroid can be removed either in whole or in part. The thyroid consists of the two lobes

FIG. 15.

Same monkey as Fig. 14, after thyroid feeding; no operation.

of thyroid tissue proper and of four parathyroids; thus the thyroid can be removed to a varying extent, and in the same animal in successive stages.

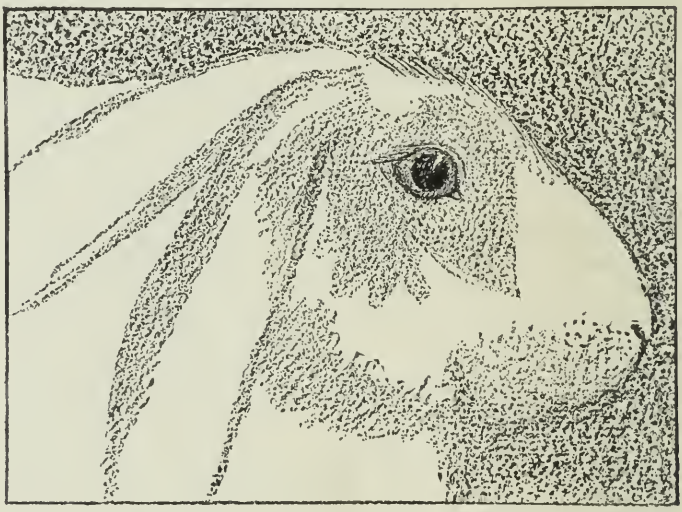
Either exophthalmos or enopththalmos, it seems, may result from these operations.

In two dogs from which I removed all the parathyroid

glands, leaving the two thyroid lobes, the palpebral fissures became narrow, and the eyes appeared to have receded. In two dogs in which three out of the four parathyroids had been removed, leaving the two thyroid lobes and (as was supposed) one parathyroid, there was proptosis and widening of the palpebral fissures; after the removal of one thyroid lobe the eyes became retracted and the palpebral fissures narrowed.

In another dog the removal of two parathyroids was followed by no perceptible change, but after one thyroid lobe with a parathyroid had been removed the eyes

FIG. 16.



Rabbit before treatment or operation.

became prominent, and after the other thyroid lobe with a parathyroid had been removed the eyes became retracted and the palpebral fissures narrowed.

In monkeys the parathyroids are so embedded in the thyroid lobes that it is hardly practicable to remove them separately, consequently we have only to consider in monkeys total excision of the thyroid.

If this produces any change it is generally enophthalmos, rarely exophthalmos.

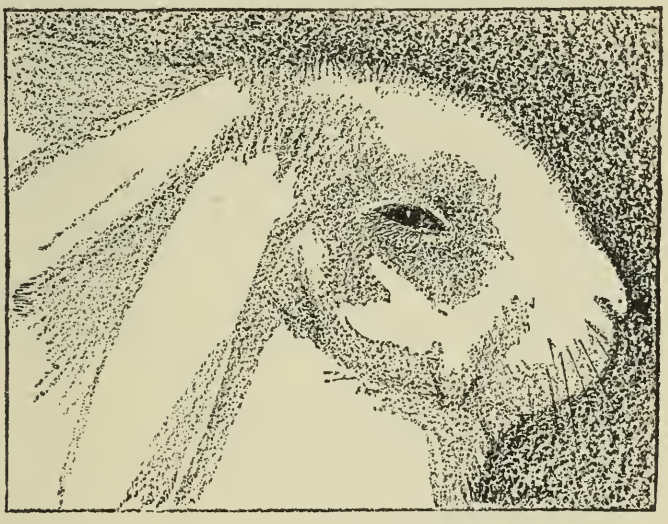
In rabbits excision of the thyroid lobes, leaving two parathyroids *in situ*, was followed in three out of four

experiments by narrowing of the eyes; in a fourth by widening of the palpebral fissures.

With respect to the reverse operation, excision of the two larger parathyroids (leaving the two smaller parathyroids and the two thyroid lobes intact), as the result of ten experiments I came to the conclusion that in five cases there was enophthalmos, in one exophthalmos, and in four no change; in these experiments sketches of the rabbits were not made, but controls were used for comparison.

In rabbits the division of both sympathetics was found

Fig. 17.



Same rabbit as Fig. 16 after excision of thyroid lobes.

in three out of six experiments to produce a moderate narrowing of the eyes; in two are extreme narrowing, and in one no obvious change.

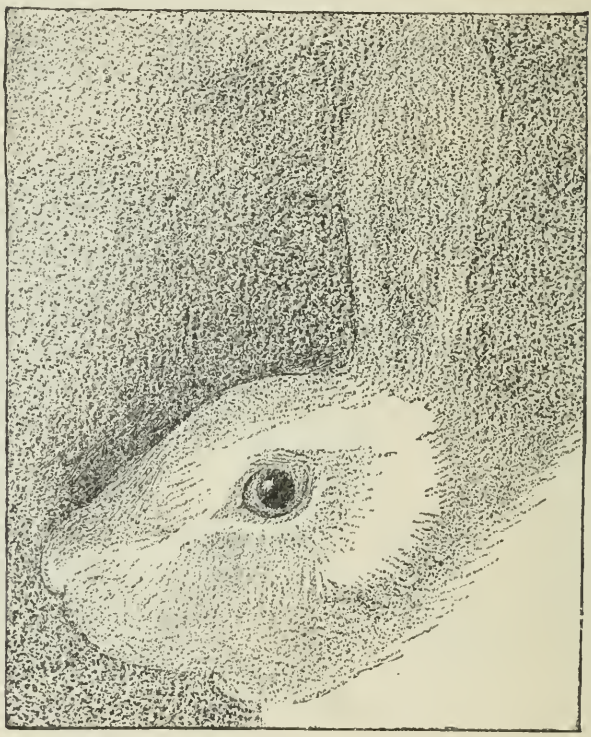
In the three rabbits in which there was moderate narrowing the thyroid lobes were excised to see if this would produce further narrowing; in two it did (Figs. 18 and 19), and in one it did not.

In the one rabbit in which division of the sympathetic produced no obvious change, excision of the lobes caused some narrowing.

The consideration of these phenomena is particularly

interesting in its bearing on the pathology and treatment of Graves's disease; the fact that the most important eye symptom of Graves's disease can be produced by the administration of thyroid preparations no doubt supports the view that it is caused by the excessive secretion of the enlarged thyroid. I have not tried the effect of division of one sympathetic before feeding with thyroid

Fig. 18.



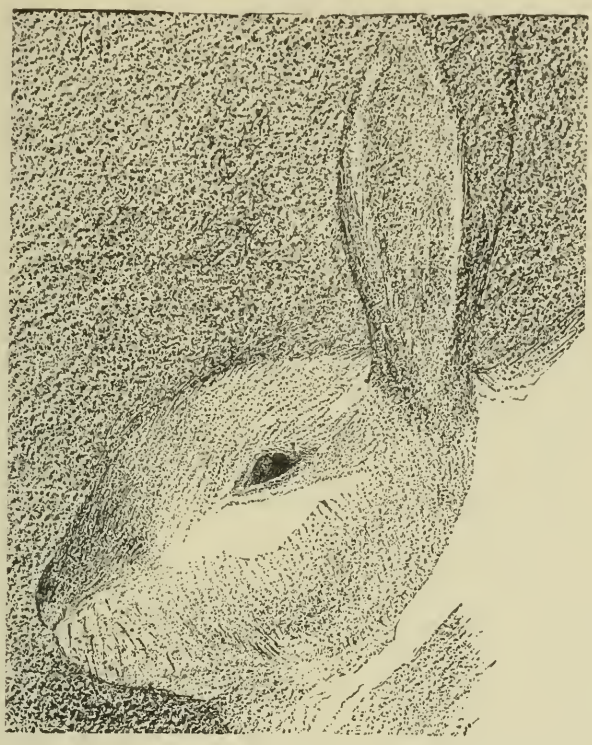
Rabbit before operation or treatment.

extract, but it certainly diminished the effect produced on that side by the subcutaneous injection of cocaine.

It therefore suggests itself that the exophthalmos might be benefited by the division of the cervical sympathetic, and indeed this operation has now been practised several times in man; as far, at least, as benefiting the general disease, the results are said not to have been very satisfactory.

I am indebted to Mr. Lapidge for the care and skill with which the sketches were made.

Fig. 19.



Same rabbit as Fig. 18 after division of both cervical sympathetics and after subsequent excision of thyroid lobes. The division of the sympathetics produced some narrowing of palpebral fissures.

References.

Béclère.—'Gaz. d. Hôp.,' Paris, October 16th, 1894.
Cunningham.—'Journ. Exper. Med.,' New York, 1898.
Jessop.—'Trans. Ophth. Soc.,' 1885.

(*January 25th*, 1900.)

Mr. Lawford said he would briefly report one case which, he regretted, was incomplete, but was similar to one quoted by Mr. Edmunds. It was a case of exophthalmos in a woman aged thirty-four, apparently produced by thyroid feeding. She came under observation at Moorfields Hospital with the following history. Five years previously she had become the subject of myxœdema, which was said to have followed diphtheria. She had the usual symptoms and signs, and was treated with prepared extract of thyroid gland at St. Mary's Hospital.

Under this treatment she improved so much that she went to her home, some distance from London, and remained well for a considerable time. In August, 1898, four years after this treatment, she again complained of headache and other symptoms, which were thought to point to a return of her former complaint. She consulted a medical man in her own village, and gave him her history. Accordingly he put her on thyroid feeding, apparently assuming that she was again becoming myxœdematous. After one week of thyroid feeding her eyes became prominent, and have become progressively more protruded, and when she came under observation in October, 1899, there was well-marked exophthalmos, rather greater on the right side. The patient did not complain of palpitation and was not emotional. The thyroid gland and the thyroid isthmus could just be felt, but they were not enlarged; probably they were abnormally small for a female. Mr. Lawford regretted that the subsequent history of the case could not be obtained. The patient was advised to go again to St. Mary's Hospital, under the care of the same physician as formerly. The history, so far as it could be obtained from the patient, seemed to be very definitely that the attack of myxœdema had been cured, or nearly cured, by thyroid treatment, and that exophthalmos had as definitely followed a second course of thyroid feeding.

Dr. George Mackay said that some years ago he was asked by one of his surgical colleagues at Edinburgh to see a young woman who had some peculiarity about the eyes. She proved on examination to be suffering from enophthalmos following a surgical operation for the removal of some enlarged glands from the right side of the neck. He was not aware that the thyroid had been touched, but he thought there could be no doubt that the cervical sympathetic was divided. He exhibited to the Society a photograph of the case. In the right eye enophthalmos was well marked. The interest of the case was that it led him to think that here possibly was a

suggestion for the treatment of exophthalmos. In the next case he was called to see with intense exophthalmos, he proposed division of the cervical sympathetic between the superior and middle cervical ganglia. The surgeon (Mr. Caird) was not prepared to carry that out, but removed half the thyroid instead, with the most gratifying results. Previously the extrusion was so extreme that both corneæ were threatening to slough, and the greatest difficulty was experienced in getting the lids to unite; in fact, the sutures broke down under the pressure of the globe upon the lid. Immediately the thyroid was removed healing set in, and most remarkable relief was given. There was a very extraordinary return of reparative power after the operation. He was interested shortly after that to notice that the operation of division of the cervical sympathetic for the treatment of exophthalmos was recommended on theoretical considerations by M. Abadie, of Paris, and about the same time M. Jonnesco, a Hungarian surgeon, actually performed that operation. Since then M. Jonnesco had published a large number of cases, and had extended the operation to the relief of glaucoma. One point which had not been mentioned by Mr. Edmunds was as to whether he had observed any effect produced on the tension of the eyes.

Mr. Juler said, with regard to the case mentioned by Mr. Mackay, he (Mr. Juler) happened to be in Paris a year last May, where he saw a case of M. Abadie's that had been operated upon for glaucoma by the removal of the upper cervical ganglion of the sympathetic, the patient being a youngish woman. It appeared that she had had considerable suffering following the operation, although the glaucomatous symptoms had been relieved after a long time.

Dr. Brailey reminded the Society that some time ago he showed some cases of increased tension in association with Graves's disease, the majority of the patients being young girls of from twenty to twenty-five years of age.

Mr. Edmunds, in reply, said with regard to the tension

of the eyeball, he was not sure that he was a competent judge of increase in ocular tension. One of his chief reasons for bringing the subject forward was to get ophthalmic surgeons to pay attention to the points he had enumerated. In one monkey in which an excessive dose of cocaine was injected by mistake, the eyes became prominent, and it appeared to him that the tension was increased; after death the eye remained tense much longer than usual. The surgeon had the choice between operating on the thyroid and on the cervical sympathetic; the thyroid operation he conceived to be the more radical. About glaucoma he knew nothing, except perhaps that experiments showed that the tension of the eye had not so much to do with the sympathetic as with the Gasserian ganglion.

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4. *Acute glaucoma following a single application of homatropine.*

By Charles H. B. Shears.

Ellen W—, æt. 52, came to the Liverpool Eye and Ear Infirmary on October 14th, 1899, asking for spectacles to improve her failing sight.

V. R. $\frac{6}{36}$ $\bar{c}$ + 3 D. sph. = $\frac{6}{12}$.

V. L. $\frac{6}{36}$ $\bar{c}$ + 2 D. sph. = $\frac{6}{36}$. This left eye was inflamed when she was a child, and there is a distinct nebula near the centre of the cornea.

One or two drops of hydrobromate of homatropine of the strength of four grains to the ounce were put into the right eye to see if there was any astigmatism or disease. Retinoscopy discovered an unimportant amount of astigmatism, but no disease of the eye was noted.

I first saw the woman a week later, on October 21st. She stated that on the evening of her visit to the hospital she was very sick, had great pain in the right eye, and her sight rapidly failed; the vomiting ceased after the first twenty-four hours, but the pain increased in severity for three days and then began to lessen; the

sight did not come back at all. When I saw her there were present in the right eye all the signs of acute glaucoma; T. + 3, pupil semi-dilated and rather oval in shape, cornea steamy, globe deeply congested, V. = fingers with great difficulty.

She was at once taken into the hospital; leeches were applied to the right temple, and a two-grain solution of sulphate of eserine put in every twenty minutes. Two hours later, there being no decrease in the tension or improvement in the sight, a general anæsthetic was administered and an upward iridectomy performed. She had a very comfortable night, and the next morning told me that she could see more distinctly. The vision improved from day to day, and when she left the hospital on November 2nd, her condition was as follows :

Right eye free from all pain or redness—T.n. V. = $\frac{6}{12}$ (three letters) with + 2·50 D. sph.—still using eserine. The ophthalmoscope showed rather a well-marked porus opticus, but no cupping of the disc up to the edge in any direction, in fact the disc did not at all suggest a glaucomatous tendency of the eye. The field of vision was taken with a white test object 15 mm. square ; there was the slightest possible contraction at the upper periphery. The left eye showed no signs of glaucoma.

I saw the patient again on January 4th, 1900 (eleven weeks after the onset of her attack) ; her eye condition was quite satisfactory, the sight and the field of vision were, if anything, better than when she left the hospital on November 2nd, 1899.

There are numerous cases on record, in our own 'Transactions' and elsewhere, of acute glaucoma following the introduction of atropine, and of course it has been recognised for very many years that any pupil dilator may cause an attack of acute glaucoma, but it appears to be extremely rare for this serious disease to follow after homatropine. No similar case appears in our own 'Transactions,' and it may be of interest to possess such a record.

Our late member, Mr. Frank Hodges, of Leicester, published a case of acute glaucoma after homatropine in the 'American Journal of Ophthalmology' for 1885 (vol. xiv, p. 42). Here a solution of the strength of eight grains to the ounce was used in both eyes, and both were attacked by glaucoma twenty-six hours later, when, as Mr. Hodges states, the maximum dilating effect of the drug must have passed off. The patient, a lady of forty-four, was seen by Mr. Hodges on the third day, and the regular use of eserine for three days restored the normal tension and the sight. With the literature at my disposal this is the only reported case in this country that I can come across, though no doubt others must have occurred.

Considering how largely homatropine must be used here and elsewhere for refraction and ophthalmoscopic purposes, and that unpleasant results so very rarely occur, it may be asked whether the risk of mishap is worth considering. However, when a case does occur it is sufficiently unpleasant and alarming. Patients with acute glaucoma seem often to consider that they have a bad bilious attack, and even their medical attendants may fail to recognise the seriousness of the situation; in this way valuable time is often lost before proper measures can be taken to relieve the tension of the eye. Happily in my case only a week had elapsed; it would be interesting to speculate how much longer the high tension might have lasted before all hope of recovery of sight would have been lost.

My own feeling is that we should always think twice before putting any mydriatic for examination purposes into the eyes of persons over thirty years of age. If homatropine is thought necessary for testing the refraction, and retinoscopy, a little eserine should be put in after the examination is over, and before the patient leaves the hospital or consulting room—it may do a considerable amount of good, and can do no harm.

For ophthalmoscopic examination alone, cocaine dila-

tation will usually suffice, this can be immediately overcome by eserine. The new mydriatic, euphthalmine, I have used a few times with satisfactory results; the pupil enlargement has been speedy, and this has passed off in a few hours. If furthur experience of this drug confirms all the good points claimed for it, it should be the ideal mydriatic for ophthalmoscopic examinations, for in a 5 per cent. solution it is said to dilate the pupil to its fullest extent in less than half an hour; it does not affect the power of accommodation, it does not increase the intra-ocular tension, and the pupil returns to its normal size in two or three hours.

(*January 25th*, 1900.)

The PRESIDENT said the case showed the possible danger frequently run by those of the profession who were not ophthalmic surgeons when they used unnecessarily strong solutions of atropine. The usual reason alleged was that the case was thought to be one of iritis; and in nine out of ten cases it was found that the full pharmacopœial strength had been employed, whereas one fourth of a grain would have been sufficient to discover whether iritis was present. He only wished his voice could reach the ordinary members of the profession, and appeal to them not to use those very strong mydriatic hammers to crack what often turned out to be exceedingly trivial ophthalmic nuts.

Mr. JOHNSON TAYLOR said a few years ago he had a case similar to that mentioned by other speakers. The patient was a lady on whom he used one hundredth of a grain of homatropine and cocaine, after which he sent her back into his waiting-room. From thirty to forty-five minutes after examining her in the dark-room, on opening the windows she complained of her sight being hazy. On examination he found that the tension had gone up from normal to about +2. There was no pain, nor congestion. He promptly put in a $\frac{3}{4}$ per cent. solution of eserine, and sent her home. He felt that if he

had sent the patient home before watching the case she might possibly have had an attack of acute glaucoma.

Dr. Brailey thought that the explanation of a glaucoma attack after homatropine instillation lay in the presence of glaucoma in an extremely slight or an intermittent form. He had for many years taken occasional advantage of this tendency by instilling homatropine into cases where a minute rise of tension was doubtful to the finger. An appreciable rise occurs in many such cases, and settles the diagnosis.

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5. *Family tendency to ophthalmoplegia externa.*

By W. M. Beaumont.

In the accompanying chart of the pedigree of the D— family the males are represented by squares and the females by circles.

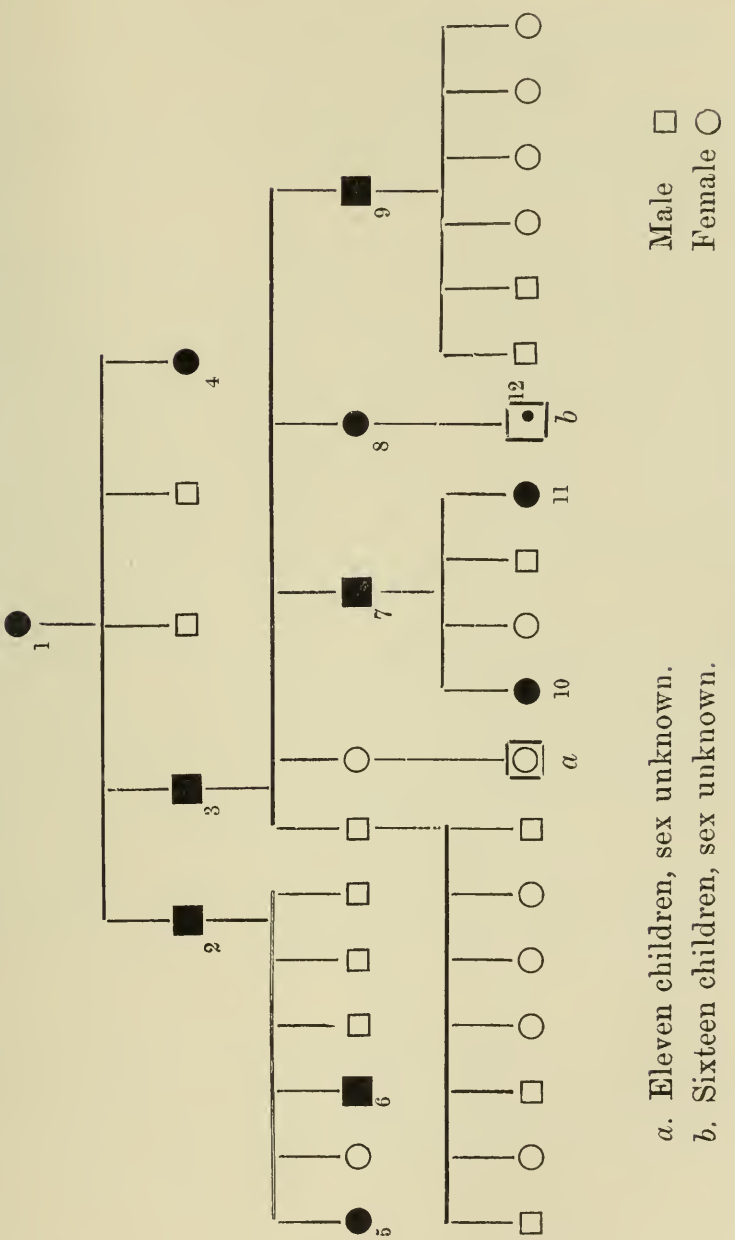
Case 1.—The ancestress of all the others is the first member of the family, as far as is known, to have had ptosis. That she suffered from it the present generation are unanimous; whether she had any other paralysis of the ocular muscles is unknown. This is not remarkable, for the living members of the family have never found out for themselves that they had little or no power to move the eyes. This old lady died many years ago at a very advanced age.

Case 2.—Her eldest son suffered in the same way, but lived to be ninety. He was well known to many members of the family, and there is no doubt about the ptosis.

Case 3.—His brother suffered in the same way, but lived to be eighty-five. From his photograph one can

FIG. 20.

PEDIGREE OF THE "D" FAMILY.



a. Eleven children, sex unknown.
b. Sixteen children, sex unknown.

see how complete the ptosis was in this case. Two other brothers were not, but

Case 4, an only sister, was affected.

Case 5.—In the third generation a female member of the family was operated on by the late Mr. Mason, of Bath, for ptosis.

Case 6.—Her brother suffered in a similar way, and was operated upon in London for ptosis. By a fortunate accident I discovered that he had been under Mr. Lawford, by whom he was shown at a meeting of this Society, in 1887, as a case of ophthalmoplegia externa of long duration, without other symptoms. Full details of his case are given in vol. vii of the 'Transactions,' p. 260. There was complete paralysis of the levator palpebræ on each side, and very slight action of any of the recti; the pupils acted well to light and to accommodation, otherwise he was a healthy man of sixty. His five children are now grown up, but none of them at present have any ophthalmoplegia. Although he denied that his father (Case 2) had drooping lids, several members of the family are quite certain that he had, though not so marked as in the case of his grandmother (Case 1). He was killed in a street accident a few years after being shown to this Society.

Case 7.—A first cousin of this man consulted me in 1894, when he was sixty years of age, on account of double ptosis, which began before he was thirty years of age, and had been slowly increasing since. The lids almost completely covered the pupils, and in order to see he threw his head back in the well-known manner usual in such cases. If the lids are raised he sees double. There was a good deal of over-action of the occipito-frontalis, but the result was not very appreciable, and only the very slightest movement of the eyes inwards, outwards, up-

wards, or downwards was possible, whilst rotation appeared to be quite abolished. There was nothing special to remark in the fundus except a myopic crescent below the discs, and with correction he saw very well. His general health was good; he had never had syphilis, nor any serious disease. There was no anæsthesia; the pupils acted well both to light and accommodation. His field of vision and his colour sense were good. I did not see him again till 1899, and in the interval he had had the ptosis relieved by operation; otherwise the only change in his condition was an increased fixity of the eyes. It was noted that his orbicularis muscles were very feeble; he could shut his eyes closely, but the lids could easily be separated even when he made an effort at resistance. Mr. Richardson Cross saw this man in 1892, and found the ophthalmoplegia externa well marked. (A photograph of this patient showed the ptosis after it had been relieved to some extent by operation.)

Case 8.—His sister, a year or two younger, he says, suffers in the same way, but I had no opportunity of seeing her. Her photograph, however, clearly shows the ptosis. She is a married woman with sixteen children, but none of them are affected.

Case 9.—A brother of the last two has been a patient of Mr. H. G. Terry, of Bath, for well-marked ptosis and ophthalmoplegia externa. He has been affected with it for nearly twenty years, and is now æt. 59. There is nothing special in the fundus of the eyes, but the correction of his vision for hypermetropic astigmatism gives him $\frac{6}{18}$ only. The photograph shows that his ptosis is well marked.

Case 10.—In the fourth generation is the eldest daughter of Case 7. She consulted me in July, 1899, and was then æt. 38. The symptoms of ptosis had been coming on for ten years. Her vision was $\frac{6}{6}$ in each eye;

she had no nystagmus and no facial anæsthesia. The lids drooped over the pupils, interfering with vision, and giving a sleepy expression to her face. She could move the eyes moderately well inwards, outwards, and downwards, but less so upwards, and her field of fixation was correspondingly contracted. Her principal complaint was that she had to turn her head to look at anything that was not in the direct visual axis. Her orbicularis muscles acted well, and were quite strong. She had no cycloplegia and no iridoplegia; she was not deaf, her senses of taste and colour were good, and her knee-jerks normal. The ptosis was slightly relieved by a Pagenstecher's operation. Mr. Richardson Cross saw this patient eight years previously, and he tells me the ophthalmoplegia was then well marked.

Case 11.—A sister of the last patient, æt. 30, was unaware of anything being amiss with her eyes, but upon examination distinct symptoms of commencing ophthalmoplegia were discovered. The movements of the eyes were limited in all directions; there was arching of the brows, and well-marked action of the occipito-frontalis.

In this family a sister is epileptic and a brother phthisical; otherwise the rule is in other branches of the family for the history to be good.

Case 12.—A first cousin of the last is a young woman aged about 22, one of a family of sixteen living in Australia, the sex of the other children being unknown. In this case some paralysis of the ocular muscles is said to have recently come on, and the ptosis is clearly seen in the photograph shown. Her brothers and sisters are said to be quite free.

The tendency of nuclear disease to appear in several members of a family has been noted by many observers. Hirschberg relates details of a father and child afflicted with ophthalmoplegia associated with epicanthus ('Ophth.

Rev.,' vol. iv, p. 309) ; also of three generations of a family with ophthalmoplegia and ptosis (quoted by Gowers, 'Diseases of the Nervous System,' 1888, vol. ii, p. 185). Gowers notes the tendency of congenital ptosis to run in families (op. cit., p. 187). Fuchs describes a case of progressive paralysis of the levator, remarking that six members of the family (three generations) had been afflicted with ptosis ('Archives of Ophthalmology,' vol. xxviii, p. 431). Panas records, with a photograph, particulars of six members of a family suffering from hereditary ophthalmoplegia externa, in which the ophthalmoplegia was congenital ('Archives d'Ophtalmologie,' vol. xvi, p. 721). In the cases I have mentioned the disease was never congenital, but always appeared in adult life ; was slowly progressive, and never appears to have had a fatal termination. There is no Graves's disease in the family, and their characteristics are long life and troops of children. I am sorry that the notes are so fragmentary in consequence of difficulties of time and space, for the cases are distributed over four generations and also over four quarters of the globe.

(*March 8th*, 1900.)

The President thanked Mr. Beaumont on behalf of the Society for the very interesting series of cases he had brought forward, and said that the tendency of modern medicine was to discredit the part played by heredity; but undoubtedly Mr. Beaumont's paper threw a considerable weight of evidence into the opposite scale.

Mr. Cross said that Mr. Beaumont, knowing that the patients had consulted him in one or two cases, communicated with him on the subject. The family history was so very definite that he had made a diagram—not of such a thoroughly detailed character as Mr. Beaumont's —showing that the family was very largely infected by the disease. There was no doubt whatever that the patients he saw were suffering from ophthalmoplegia

externa. Although the muscles were only partially paralysed, every one of them was affected.

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6. *Green vision.*

By H. Work Dodd.

Some months ago it fell to my lot to exhibit to this Society a man who saw everything green.

It was the first case of the kind that I had ever seen, and from what I could gather, it was also a new experience to my friends and colleagues.

I have to lay before you to-night the results I have obtained in looking up the history of this remarkable state of the vision.

For this paper I have abstracted liberally, and, where necessary, translated freely from the material that came to my hand. I wish here to acknowledge the assistance I have derived from the various authors whose names I quote.

1. The earliest recorded case of this peculiar condition appears to be that of Mackenzie, which is mentioned in his book upon the 'Diseases of the Eye,' 1835. He speaks of a patient, with prolapsus of the nasal portion of the iris through an accidental wound of the cornea, who saw green. There is unfortunately nothing more than this brief notice obtainable.

2. Szokalski gives Prof. Lenoir's case. In 1837 he saw a girl who for several weeks had seen everything red. In one night this anomaly suddenly changed, so that the patient, to her great astonishment, the next morning saw everything green.

Being unable to obtain the original reference, I am indebted to Dr. Hilbert's paper on "Green Vision" for the above extract.

3. In 1887 Purtscher records the case of a doctor, æt. 54 years, who had a cataract extracted from the right eye on October 25th, 1885. The left eye was cataractous also. He had been very short-sighted on both sides, wearing glasses — 5 D. The operation on the right eye was normal, though the coloboma was wider than desired. Healing took place without trouble, and the patient, later on, saw well. He repeatedly said that his vision had never been so clear and sharp before, only everything was peculiarly pale. On August 19th, 1886, the patient returned and stated that on August 14th, 1886, while walking in the bright moonshine, he had made the peculiar observation that the moon appeared intensely bright carmine-red. By lantern light he observed nothing abnormal. He could not remember any special cause. In the daytime he had worn tinted glasses continually. On the four following evenings the moon appeared the same colour to him. On the fifth evening the patient was in a long narrow room, standing before a window hung with white curtains. A pair of trousers he was looking at, to his surprise, appeared to be intensely green, like "a green curtain." The true colour of the trousers was a modified black. He took them to an uncurtained window, and the colour then appeared normal. The following evening the patient saw the wall of a room as in a red glow. On partially closing his lids the red colour disappeared from the wall, but the light of a candle flame became "gold-green," shimmering like "green-golden beetles." With open eyes this flame had a touch of red.

4. Purtscher gives a second case, that of a merchant, a myope, who came on March 7th, 1885, complaining of peculiar disturbances of vision. He had suffered a long time from migraine, particularly on the right side. When this was very severe the left side also became affected. He said that when his head became warm, he noticed, in the right eye, that something like a shadow sank from above downwards. This appearance might not occur for

months; sometimes he remarked it twice in a week. In such an attack the upper halves of the visual fields became quite dark; the border was sharply defined horizontally. This lasted some minutes. Mostly the symtoms came on when reading. Ten days before coming he had an attack which lasted about ten minutes. Four days before his visit he noticed, about six o'clock in the evening, a beautiful "rose light" before the right eye. Going, according to his custom, into a coffee-house, he saw everything in a "green light." Afterwards, when he went into the street, he again saw everything in a rose light. Since then the patient has seen everything in a light rosy shimmer. Examination showed both optic nerves small, vertically oval, the right rather pale, in the lower part somewhat of a greenish colour. On both sides there was a striking distribution of the larger veins, they running nearly uniformly radially. The left optic nerve was rather hyperæmic. The borders of both discs were indistinct. There was no anomaly of the visual fields.

5. In the 'St. Louis Medical and Surgical Journal' Williams published a case of "Green Vision in Spots." Here I was, again, unable to obtain the original account.

6. Dr. Hilbert, in 1893, gave the case of a very nervous woman, 63 years of age, who occasionally suffered from flickering scotoma. He says that he was called by her husband because she, after one day's attack of flickering scotoma, was the subject of an unbearably severe hemicranial headache on the right side. The patient lay groaning in bed; she, however, could describe with great volubility her sufferings. These, beyond the pain in the head, consisted in loss of appetite, nausea, vomiting, and a pressure around the whole body corresponding to the attachments of the diaphragm. But what appeared most interesting, and caused the patient, also, not a little fear, was the fact that everything she saw appeared to be in a grass-green cloud. The green vision came on immediately after the headache, and associated with depression of

visual acuteness, became more and more intense. Neither daylight nor lamplight caused any alteration in this sensation. The closing of one or the other eye was without influence upon it.

The examination of the eyes showed nothing abnormal, with the exception that the vessels were markedly sinuous. It was impossible to take the visual fields. The perception of other colours was neither effaced nor changed through the green vision. The refraction was slightly hypermetropic (+ 2 D.). The next morning the headache had gone and the green vision had disappeared. The visual acuteness had returned to normal. She felt well with the exception of loss of appetite and a confused feeling in her head.

Dr. Hilbert remarks that it is evident the arising of green vision in this case was due to a central cause, and in no way produced by external influences. The woman was neurasthenic and easily excitable. She suffered sometimes from flickering scotoma, and one day instead of this affection, without any comprehensible cause, migraine, which is so closely related to flickering scotoma, came on; and this in combination with green vision. We can scarcely fail to look upon the green vision, equally with the migraine and the flickering scotoma, as central in origin.

Dr. Hilbert thinks that in his own, as also in other cases, the green vision appears to be central in origin; it must therefore be regarded as a sort of visual hallucination, as a colour hallucination.

7. Dr. Hirschberg, in 1893, published a case of "Green Vision in one Eye," occurring in a case of detachment of the retina.

A man æt. 33, who showed strongly marked syphilitic eruptions (rupia, patches on the forehead, etc.), who had been under treatment for five weeks, and who, since a few days, complained of green vision with the right eye. The clear window of the room looked as if made of dull green glass. There was a slight, but distinct, detachment

of the retina in the middle of the fundus. The acuteness of vision was lessened. There was a large scotoma in the middle of the visual field. The other eye was normal.

Dr. Hirschberg says the cause of the detachment is remarkable. Possibly patches were existing in the choroid, resembling those on the forehead, with cell multiplication and exudation of fluid. Under appropriate treatment perfect recovery soon followed. Usually blue or violet is seen in retinal detachment ; also in severe retinal hæmorrhage (for example, in blocking of the veins) the patients complain of blue vision.

Dr. Hirschberg appears to regard green vision as peripheral in origin.

8. In 1884 Dr. Somya recorded two cases of green vision. Both of these were patients of Prof. Schöler. The first, a workman æt. 42 years, presented himself, saying that he saw everything green with the left eye. There was a slight conjunctival catarrh in this eye, with myopia of 2·50 D. On the right side there was −1 D. Visual acuteness was below normal. In trying the colour perception it was found that, while the right eye showed very accurate appreciation of shades, the left eye gave totally uncertain results. The patient was acquainted with this, and stated that the condition had existed about eight days. It was arranged to examine the man thoroughly the next day, but then the phenomenon was gone. Left and right he could distinguish the finest differences of shade. The visual fields were normal. The visual acuteness was as on the former day. With the ophthalmoscope the left macula and vitreous were not so clear as on the right side. Unfortunately this patient was lost sight of.

9. The second case was that of a lady who complained of green vision in both eyes. Here there was a fresh choroiditis of the macular region, with slight peripheral changes, and slight opacity of the vitreous. The vision on both sides was lessened. With + 4 D. sph. she could read the smallest print. All colours could be recognised;

though they always appeared as if a sea-green light were drawn over them. The visual fields showed a decided central and paracentral scotoma, extending towards the right, for all colours. In this region a subjective green perception existed. During six weeks' treatment the visual acuteness improved. The green vision remained the whole time. The "yellowish-green fog" or the "greenish shimmer" became gradally lighter. The perimeter observations remained as before. The choroiditis improved, and the vitreous became perfectly clear.

Dr. Somya goes on to say that a comparison of his two cases shows points of agreement. With regard to the green vision, both patients spoke of it as sea-green, as a light greenish cloud or light that was spread over the subject they were looking at. Dr. Somya lays particular stress upon the ophthalmoscopic conditions, especially upon the fact that, in both cases, the visible ophthalmoscopic changes were so extremely slight. Just because of these extremely slight, nearly negative changes, he is led to the hypothesis that in rare cases slight changes in the choroid appear to influence the perception of colours, or cause a special colour perception.

10. In the 1899 volume of our own 'Transactions' (p. 281) is given in full my own case of a man æt. 32 years, an artist, who was the subject of tabes dorsalis. In July, 1898, he complained of defective vision only, having previously seen well, and in September, 1898, of coloured vision, which came on suddenly, seen with both eyes. The visual acuteness was very much lessened, and the ophthalmoscope showed well-marked optic atrophy in both eyes. The fields of vision were contracted. He saw everything of bright emerald green. He described his state as having a fenestrated emerald green veil between him and the outside world: everything seemed to be on the further side of the veil. Though the emerald green predominated in intensity over his fields, yet he always saw in the irregular fenestrations of the veil, a bright rose-pink colour, speckled thickly with

emerald green, so that the rose-pink showed through the green. The first impression of everything was green, and the rose-pink was secondary. The colours were always present, day and night. He saw them with his eyes shut and in a dark room, and they were then more brilliant. Several times in ordinary gaslight he had noticed that the room seemed suddenly to be filled with very brilliant light, lasting an hour or two, and then gradually fading away. When I showed this case last year, this state of things had existed four months. I may say that, at the present time, as far as the green vision is concerned, the patient is in the same condition, making in all twenty-four months.

Mr. Herbert H. Folker publishes "Notes on Five Cases of Toxic Amblyopia (lead)," in the 1899 volume of our 'Transactions;' three of these cases saw green.

11. The first case was that of a married woman æt. 26 years, who had suffered from repeated attacks of lead poisoning. She was first seen on March 14th, 1898. On February 21st, 1898, she first noticed her vision failing in the left eye, all objects appearing to be tinted a blue-green, and she experienced flashes of light. This state of things lasted two days, and then disappeared. Four days later the right eye began to fail in the same way, and both eyes have gone rapidly worse. The left eye is quite blind, and in the right eye the vision is considerably lessened. The pupils are widely dilated, and do not react either to light or accommodation. The disc of the left eye is blurred generally with white striæ radiating from the centre. The vessels are very curved, and there are several medium-sized patches of hæmorrhage situated chiefly on the temporal side. The retina appears swollen more or less all over, the vessels being entirely lost to view here and there. The right eye is in a similar condition, though not so marked. The field of vision for the right eye is contracted; that of the left could not be taken. On April 19th, 1898, there was only perception

of light left. Both discs are atrophied. The patient walks with an ataxic gait.

12. The second case is that of a single woman, æt. 20 years, who came on April 4th, 1898. This woman also had repeated attacks of lead poisoning. She first noticed her vision failing in August, 1897, the first sign being a sudden total loss of colour vision when looking at some flowers. The vision became gradually worse. A fortnight after she noticed loss of colour she experienced flashes of light, sometimes white, sometimes green, which condition lasted about fourteen days. The fields of vision were contracted. On May 12th, 1898, the vision had improved considerably. In this case the fundus showed typical neuro-retinitis with small patches of hæmorrhage scattered about.

13. The third case is that of a boy æt. 16 years, who had diplopia and symptoms of lead poisoning in October, 1896. His vision first began to fail in November of the same year, and in six weeks he became totally blind. During these six weeks on two or three occasions he had a "green vision" lasting some hours at a time and then disappearing altogether. The first three days of his blindness he noticed flashes of bright white light, but he has had no repetition of this since. The discs are very white and the vessels small; the arteries appear as white streaks with a red line running down the centre. The retina is pale all over, but especially so on the temporal side of the disc. There are no signs of hæmorrhage or retinal swelling in this case.

In reviewing these thirteen cases it is apparent that neither sex nor age has to be especially considered. Also that errors of refraction and their effects may be excluded.

The condition of the general health is noticeable in seven of the cases, two patients suffering from migraine, two having histories of syphilis (one of these suffering from rupia, and the other from tabes dorsalis), the other three of the seven being subjects of lead poisoning.

No of case.	Sex.	Age.	Eye conditions.	General health conditions.	Colours seen, etc.
1	—	—	Wound of cornea, with prolapse of iris	—	Saw green.
2	Girl	—	—	—	Had seen red for several weeks, and one morning saw everything green.
3	Man	54	Cataract operation, R. E. Myopia	—	For some days he saw carmine-red; then indoors he saw green, this also with closed lids; with open lids red again.
4	Man	—	Flickering scotoma, R. E. Myopia; small optic discs, right rather pale; radial distribution of veins; indistinct disc borders	Migraine, right side	R. E. Rose light four days; then indoors he saw green, out of doors he saw rose.
5	—	—	—	—	Green vision in spots.
6	Woman	63	Flickering scotoma; lessened visual acuteness; sinuous vessels in fundus	Migraine, right side	A grass-green cloud immediately after headache; one day in duration.
7	Man	33	Central detachment of retina	General syphilis (rupia, patches on forehead, etc.)	R. E. Green vision for a few days.
8	Man	42	L. E. Conjunctival catarrh; myopia; uncertain colour perception; lessened visual acuteness; left macula and vitreous not so clear as normal	—	L. E. Saw everything green for eight days.
9	Woman	—	Fresh choroiditis of macula, with peripheral changes; vitreous opacities; vision lessened; visual fields = central and paracentral scotoma	—	Both eyes saw green—a sea-green light, a greenish shimmer, yellowish-green fog. Six weeks in duration.
10	Man	32	Optic atrophy and its accompanying changes	Tabes dorsalis; syphilis	Saw all bright emerald green; a fixed green veil with rose-pink spots in its fenestrations, also yellow specks. About twenty-four months in duration.
11	Woman	26	Neuro-retinitis with hæmorrhages on temporal side; subsequent atrophy	Lead poisoning; ataxic gait	Saw blue-green for two days.
12	Woman	20	Neuro-retinitis	Lead poisoning	Flashes of light, sometimes green and sometimes white, lasting fourteen days.
13	Boy	16	Optic atrophy; retina especially pale	Lead poisoning	Green vision, lasting for some hours and

It is more interesting to remark that ten of the thirteen cases show departures from the normal in the ocular structures (two of the others being the cases of which I could not obtain the full histories and, therefore, must be excluded). To these cases that of Dr. Hilbert might also be added (6), in which the vessels are noted as being markedly sinuous, though he lays no particular stress upon this.

Having already stated these abnormalities, I will not take up your valuable time by repeating them, but they may be seen at a glance in the accompanying table.

With the exception of Case 1 (wound of cornea, with prolapse of iris) and of Case 3 (cataract operation and myopia) all the abnormalities are in connection with the optic nerve and retina. It seems, then, that green vision is a symptom associated with changes more or less active, temporary or permanent, in these structures. Its presence in relation to optic-nerve troubles may perhaps be regarded as being of evil import.

As to the reason these people have green vision these cases give but little information. It should, however, be pointed out that the macular region of the retina in three of these cases is affected, and in two of the others the temporal side of the retina is indicated as being particularly disturbed. Looked at in the light of our knowledge of the conditions existing in tobacco amblyopia, possibly the same tissues are affected in the two conditions.

Dr. Purtscher's two cases (3 and 4), who only had green vision when indoors, should not be overlooked, as that state seemed to depend on the character or degree of the illumination.

References.

Mackenzie.—'Practical Treatise on Diseases of the Eye,' 1835.

Szokalski.—'Ueber die Empfindungen der Farben in phys. und pathol. Hinsicht,' Giessen, 1892, p. 152.

Purtscher.—"Neue Beiträge zur Frage der Erythropie," 'Archiv f. Augenheilk.,' vol. xvii, 3, 1887.

Williams.—"Green Vision in Spots," 'St. Louis Med. and Surg. Journ.,' vol. lx, 3, p. 168.

Hilbert.—"Die Chloropie," 'Centralblatt f. Augenheilk.,' 17 Jahr., p. 50, 1893.

Hirschberg.—"Grünsehen auf einem Auge," 'Centralblatt f. Augenheilk.,' 17 Jahr., p. 110, 1893.

Somya.—"Zwei Fälle von Grünsehen," 'Zeitschrift f. Psychol.,' vol. vii, p. 305, 1894.

H. Work Dodd.—"Green Vision in a Case of Tabes Dorsalis," 'Trans. Ophthal. Soc.,' 1899, p. 281.

Herbert H. Folker.—"Notes on Five Cases of Toxic Amblyopia," 'Trans. Ophthal. Soc.,' 1899, p. 257.

(*March 8th*, 1900.)

XIII. INSTRUMENTS.

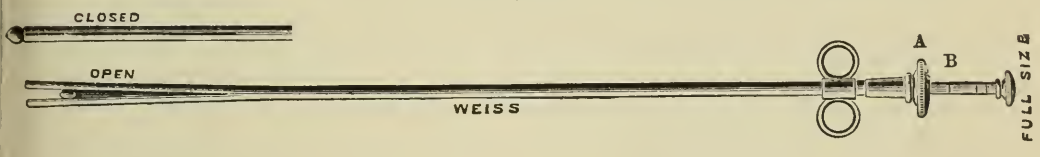
Nasal duct dilator.

By G. Darell Maynard.

This dilator when closed is only a little larger than a No. 2 Bowman's bulbous probe; the maximum dilatation of the terminal portion is equal to the diameter of a No. 7.

By turning the screw (A) the inner rod (B) is pulled through a steel tube and the probe point separates the

Fig. 21.



split extremity. There is a series of fine lines on the steel rod (B) indicating the amount of dilatation; these range from the size of a No. 3 Bowman's bulbous probe to No. 6, full dilatation equalling No. 7.

The dilator is small enough to be passed through the partially slit upper canaliculus; dilatation can then take place. The pressure on the stricture being from within out (and not as in the usual method from above downwards) does not tend to tear the mucous membrane from the walls of the bony canal and cause bleeding. Also the stretching and displacement of the canaliculus is reduced to a minimum; and finally, the dilatation is very nearly painless if not done too rapidly.

(*December 14th*, 1899.)

The Chairman (Mr. A. Q. Silcock) asked whether Mr. Maynard found any difficulty in passing the instrument in patients with prominent frontal eminences.

Mr. Maynard, in reply, said he had passed it in from twenty-five to thirty cases, and in only one was it impossible to do so. In reply to the Chairman's suggestion, the instrument-maker said he did not think he could make the handle curved.

APPENDIX.

The following communications were also brought before the Society during the session.

Inflammatory patch in retina (tubercle ?)
M. T. Yarr (October 19th, 1899).

Bifurcation of retinal vein.
H. Work Dodd (November 9th, 1899).

Macular changes.
A. Stanford Morton (December 14th, 1899).

Changes in the macular area consequent upon injury.
G. B. James (December 14th, 1899).

Case of peculiar appearance in the cornea.
R. W. Doyne (January 25th, 1900).

Case of choroiditis centralia.
N. Bishop Harman (March 8th, 1900).

Dr. Emile Berger's binocular and stereoscopic lens.
Henry Juler (May 3rd, 1900).

Sarcoma of the choroid.
Charles Higgens (May 3rd, 1900).

Unusually large corneæ with deep anterior chambers.
J. Hern (June 14th, 1900).

Symblepharon both eyes, right eye not operated on.
J. Hern (June 14th, 1900).

Persistent pupillary membrane, left eye only.
J. Hern (June 14th, 1900).

The arithmetical triangle in ophthalmology; how to use it and what it reveals (with special reference to myopia).
C. Wray (June 14th, 1900).

Work of forest scenery, illustrated from paintings by an amateur artist who had previously undergone cataract extraction.
Simeon Snell (June 14th, 1900).

Crescentic non-vascular opacities of both corneæ.
W. Adams Frost (July 6th, 1900).

REPORT OF THE COUNCIL.

Read at the Annual General Meeting of the Society, July 6th, 1900.

The Council have the pleasure to report that the past year, although not marked by any striking feature, has been a very successful one. Thirty-three members have joined the Society—an unprecedentedly large number. Four have resigned and two have died. The meetings have been well attended, the papers interesting, and the number of patients shown, especially at the clinical meetings, large.

An invitation was received a few months ago from the President of the International Congress of Medicine, to be held in Paris in August, requesting that a delegate be appointed to represent the Society. The Council unanimously requested the President to be the representative of the Society on this occasion. Should the President be unable to go to Paris, Mr. Juler was nominated; and failing him, Mr. Swanzy.

The Council have pleasure in reporting that they have arranged for the volume of the 'Transactions' to be more strongly bound, and to have the plates fixed in a more satisfactory manner.

The Bowman Lecture was delivered by Mr. Marcus Gunn on "Visual Sensation;" and all who had the privilege

of hearing it will welcome it as a lucid exposition of the present state of knowledge on this subject.

The Library has been used by members to a greater extent than in any previous year. The increase in the number of books has rendered an additional bookcase necessary. This occupies one end of the room, and will, it is hoped, give sufficient accommodation for several years. The thanks of the Council are tendered to the following gentlemen for presentations to the Library:—Mr. Stedman Bull, Dr. Charles Oliver, Mr. Percival, Dr. C. E. de Schweinitz, Mr. Snell, Professor Snellen, and Dr. Casey Wood.

An index of the second ten volumes is in preparation, and will, it is hoped, be issued with the next volume of the 'Transactions.'

The Treasurer's report and balance-sheet are in the hands of members, and show a satisfactory financial condition.

ACCOUNT OF RECEIPTS AND PAYMENTS (1899–1900)

OF THE

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Receipts.

1899–1900.	£	s.	d.
To Balance at Bankers, June 23rd, 1899	130	13	3
,, Subscriptions	250	19	0
,, Entrance Fees (23)	48	6	0
,, Composition Fees (7)	75	12	0
,, Trustees of the Bowman Fund	50	0	0
,, Messrs. Churchill, Sale of 'Transactions'	45	8	0
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Investments:

£20 East India Railway B Annuities.

£361 12*s.* 10*d.* Ramsgate Corporation 3 per cent. Stock.

(Signed) JOHN ABERCROMBIE, *Treasurer.*

June 27th, 1900.

Payments.

1899–1900.	£	s.	d.
By Rent	80	0	0
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,, Printing Vol. XIX of 'Transactions'	195	11	3
,, Illustrations for do. £66 2 6			
Less contributions from authors 8 10 0			
	57	12	6
,, New Bookcase	39	9	6
,, Reporting	17	19	10
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,, Sub-Librarian	10	10	0
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	£629	6	3

Examined, compared with vouchers, and found correct.

(Signed) { HAROLD D. GRIMSDALE, J. HERBERT FISHER, } *Auditors.*

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FOR

VOLS. XI—XX, 1891—1900.

Compiled by CLAUD WORTH.

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